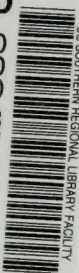


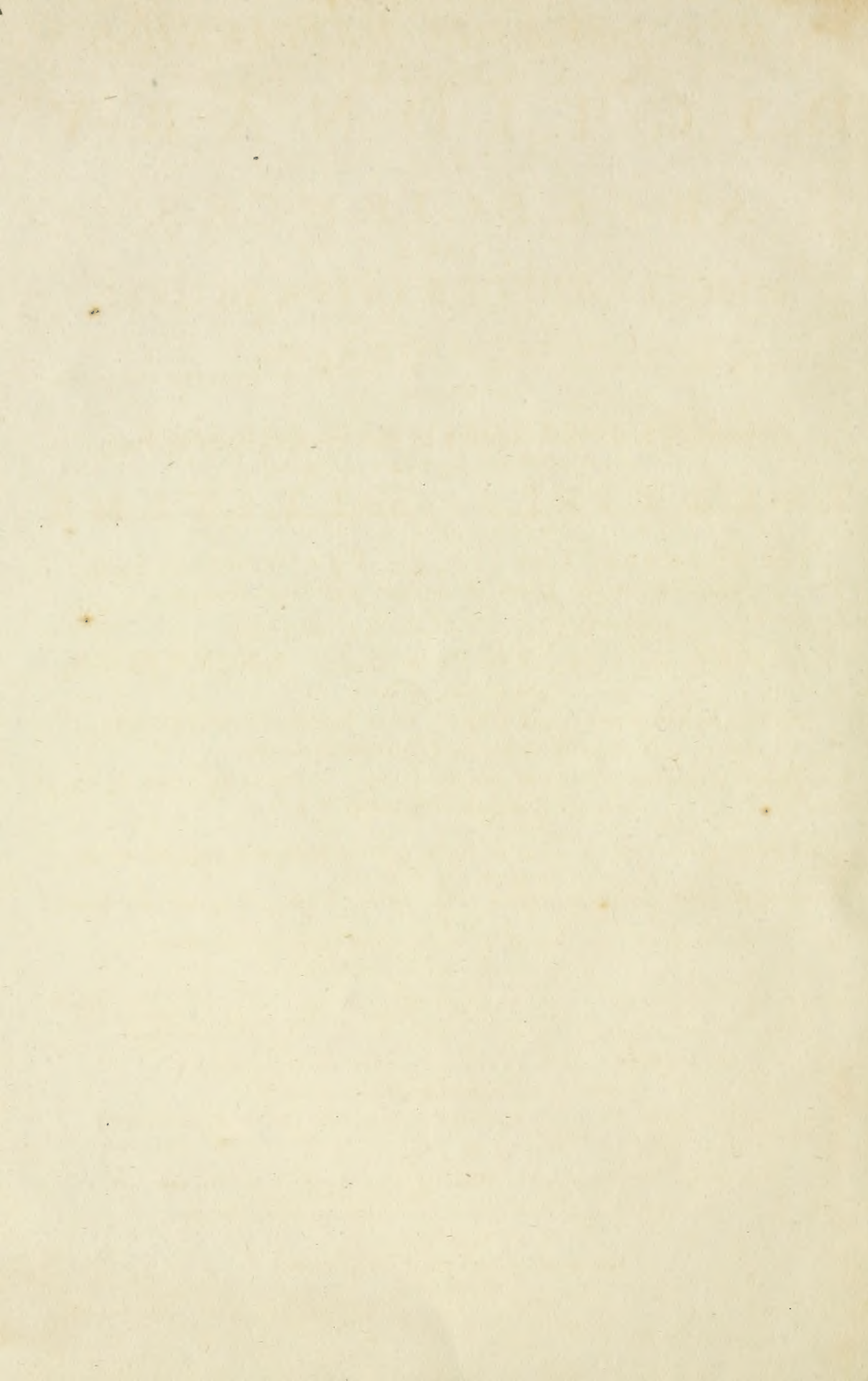
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VOL. XIV.

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P A S

passiflora. **PASSIFLORA**, or **PASSION-FLOWER**: A genus of the pentandria order, belonging to the gynandria class of plants; and in the natural method ranking under the 34th order, *Cucurbitaceæ*. The calyx is pentaphyllous; there are five petals; the nectarium a crown; the berry is pedicellated. There are near 30 different species; all of them natives of warm foreign countries, only one of which is sufficiently hardy to succeed well in the open ground here; all the others requiring the shelter of a green-house or stove, but chiefly the latter. The most remarkable are,

1. The *cærulea*, or blue-rayed common palmated passion-flower, hath long, slender, shrubby, purplish-green stalks, branchy, and ascending upon support by their clasps 30 or 40 feet high; with one large palmated leaf at each joint, and at the axillas large spreading flowers, with whitish-green petals, and a blue radiated nectarium; succeeded by a large, oval, yellowish fruit. It flowers from July until October; the flowers are very large, conspicuous, and their composition is exceedingly curious and beautiful. The general structure of the singular flowers of this plant is, they come out at the axillas on pedunculi about three inches long, which they terminate, each flower having just close under the calyx a three-lobed involucre-like appendage; a five-lobed calyx, and a five-petalous corolla, the size, figure, and colour of the calyx, &c. the petals arranging alternately with the calicinal lobes; the whole, including the involucre, calyx, and corolla, make just 13 lobes and petals, all expanded flat: and within the corolla is the nectarium, composed of a multitude of thread-like fibres, of a blue and purple colour, disposed in circular rays round the column of the fructification; the outer ray is the longest, flat, and spreading on the petals; the inner is short, erect, and narrows towards the centre: in the middle is an erect cylindric club-shaped column or pillar, crowned with the roundish germen, having at its base five horizontal spreading filaments, crowned with incumbent yellow anthers, that move about every way; and from the side of the germen arise three slender spreading styles, terminated by headed stigmas: the germen afterwards gradually becomes a large oval fleshy fruit, ripening to a yellowish colour.—These wonderful flowers are only of one day's duration, generally opening about 11 or 12 o'clock, and frequently in hot sunny weather burst open with elasticity, and continue fully expanded all that day: and the next they gradually close, assuming a decayed-like appearance, and never open any more; the evening puts a period to their existence, but they are succeeded by new ones

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daily on the same plant.—This plant and flowers are held in great veneration in some foreign Catholic countries, where the religious make the leaves, tendrils, and different parts of the flower, to represent the instruments of our blessed Saviour's passion; hence the name *passiflora*.

2. The *incarnata*, incarnated, or flesh coloured Italian passion-flower, hath a strong perennial root; slender, herbaceous stalks, rising upon support four or five feet high; leaves composed of three sawed lobes, each leaf attended by a twining tendril; and at the axillas long slender pedunculi, terminated each by one whitish flower, having a greenish calyx, and a reddish or purple radiated nectarium, surrounding the column of the fructification, which succeed to a large, round, fleshy fruit, ripening to a beautiful orange colour.—The flowers of this species are also very beautiful, though of short duration, opening in the morning, and night puts a period to their beauty; but they are succeeded by a daily supply of new ones.—The fruit of this sort is also very ornamental, as ripening to a fine reddish orange colour; but these rarely attain perfection here, unless the plants are placed in the stove; therefore when there is such accommodation, it highly merits that indulgence, where it will exhibit both flowers and green and ripe fruit, all at the same time, in a beautiful manner.

3. The *vespertilio*, or bat's-wing passion-flower, hath slender, striated, branchy stalks; large, bilobate, or two-lobed leaves, the base roundish and glandular, the lobes acute, widely divaricated like a bat's wings, and dotted underneath; and axillary flowers, having white petals and rays. The leaves of this species have a singular appearance, the two lobes being expanded six or seven inches wide, resembling the wings of a bat upon flight; hence the name *vespertilio*.

As all the species are natives of warm climates, in this country they are mostly of a tender quality, except the first sort, which succeeds very well in the full ground, in a warm situation; only their young branches are sometimes killed in very severe winters; but plenty of new ones generally rise again in spring following: the others, denominated *stove kinds*, must always be retained in that repository.

PASSION, is a word of which, as Dr Reid observes, the meaning is not precisely ascertained either in common discourse or in the writings of philosophers. In its original import, it denotes every *feeling* of the mind occasioned by an extrinsic cause; but it is generally used to signify some *agitation* of mind, opposed to that state of tranquillity in which a man is most

A

master

Passiflora,
Passion.

Passion.

master of himself. That it was thus used by the Greeks and Romans, is evident from Cicero's rendering *passio*, the word by which the philosophers of Greece expressed it; by *perturbatio* in Latin. In this sense of the word, passion cannot be itself a *distinct and independent* principle of action; but only an occasional degree of vehemence given to those dispositions, desires, and affections, which are at all times present to the mind of man; and that this is its proper sense, we need no other proof than that passion has always been conceived to bear analogy to a storm at sea or to a tempest in the air.

With respect to the number of passions of which the mind is susceptible, different opinions have been held by different authors. Le Brun, a French writer on painting, justly considering the expression of the passions as a very important as well as difficult branch of his art, has enumerated no fewer than twenty, of which the signs may be expressed by the pencil on canvass. That there are so many different states of mind producing different effects which are visible on the features and the gestures, and that those features and gestures ought to be diligently studied by the artist, are truths which cannot be denied; but it is absurd to consider all these different states of mind as *passions*, since tranquillity is one of them, which is the reverse of passion.

The common division of the passions into *desire and aversion, hope and fear, joy and grief, love and hatred*, has been mentioned by every author who has treated of them, and needs no explication; but it is a question of some importance in the philosophy of the human mind, whether these different passions be each a degree of an original and innate disposition, distinct from the dispositions which are respectively the foundations of the other passions, or only different modifications of one or two general dispositions common to the whole race.

The former opinion is held by all who build their system of metaphysics upon a number of distinct internal senses; and the latter is the opinion of those who, with Locke and Hartley, resolve what is commonly called instinct into an early association of ideas. (See *Instinct*). That without deliberation mankind instantly feel the passion of fear upon the apprehension of danger, and the passion of anger or resentment upon the reception of an injury, are truths which cannot be denied: and hence it is inferred, that the seeds of these passions are innate in the mind, and that they are not generated, but only swell to magnitude on the prospect of their respective objects. In support of this argument, it has been observed that children, without any knowledge of their danger, are instinctively afraid of being placed on the brink of a precipice; and that this passion contributes to their safety long before they acquire, in any degree equal to their necessities, the exercise of their rational powers. Deliberate anger, caused by a voluntary injury, is acknowledged to be in part founded on reason and reflection; but where anger impels one suddenly to return a blow, even without thinking of doing mischief, the passion is instinctive. In proof of this, it is observed, that instinctive anger is frequently raised by bodily pain, occasioned even by a stick or a stone, which instantly becomes an object of resentment, that we are violently

inclined to crush to atoms. Such conduct is certainly not rational, and therefore it is supposed to be necessarily instinctive. Passion.

With respect to other passions, such as the lust of power, of fame, or of knowledge, innumerable instances, says Dr Reid, occur in life, of men who sacrifice to them their ease, their pleasure, and their health. But it is absurd to suppose that men should sacrifice the end to what they desire only as means of promoting that end; and therefore he seems to think that these passions must be innate. To add strength to this reasoning, he observes, that we may perceive some degree of these principles even in brute animals of the more sagacious kind, who are not thought to desire means for the sake of ends which they have in view.

But it is in accounting for the passions which are disinterested that the advocates for innate principles seem most completely to triumph. As it is impossible not to feel the passion of pity upon the prospect of a fellow-creature in distress, they argue, that the basis of that passion must be innate; because pity, being at all times more or less painful to the person by whom it is felt, and frequently of no use to the person who is its object, it cannot in such instances be the result of deliberation, but merely the exertion of an original instinct. The same kind of reasoning is employed to prove that gratitude is the exercise of an innate principle. That good offices are, by the very constitution of our nature, apt to produce good will towards the benefactor, in good and bad men, in the savage and in the civilized, cannot surely be denied by any one in the least acquainted with human nature. We are grateful not only to the benefactors of ourselves as individuals, but also to the benefactors of our country; and that, too, when we are conscious that from our gratitude neither they nor we can reap any advantage. Nay, we are impelled to be grateful even when we have reason to believe that the objects of our gratitude know not our existence. This passion cannot be the effect of reasoning, or of association founded on reasoning; for, in such cases as those mentioned, there are no principles from which reason can infer the propriety or usefulness of the feeling. That *public spirit*, or the affection which we bear to our country, or to any subordinate community of which we are members, is founded on instinct; is deemed so certain, that the man destitute of this affection, if there be any such, has been pronounced as great a monster as he who has two heads.

All the disinterested passions are founded on what philosophers have termed *benevolent affection*. Instead therefore of enquiring into the origin of each passion separately, which would swell this article to no purpose, let us listen to one of the finest writers as well as ablest reasoners of the age, treating of the origin of benevolent affection, "We may lay it down as a principle (says Dr Reid †), that all benevolent affections are in their nature agreeable; that it is essential to them to desire the good and happiness of their objects; and that their objects must therefore be beings capable of happiness. A thing may be desired either on its own account, or as the means in order to something else. That only can properly be called an object of desire which is desired upon its own account; and

† *Essays on the active Powers of Man.*

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and therefore I consider as benevolent those affections only which desire the good of their object ultimately, and not as means in order to something else. To say that we desire the good of others, only to procure some pleasure or good to ourselves, is to say that there is no benevolent affection in human nature. This indeed has been the opinion of some philosophers both in ancient and in later times. But it appears as unreasonable to resolve all benevolent affections into self-love, as it would be to resolve hunger and thirst into self-love. These appetites are necessary for the preservation of the individual. Benevolent affections are no less necessary for the preservation of society among men; without which men would become an easy prey to the beasts of the field. The benevolent affections planted in human nature, appear therefore no less necessary for the preservation of the human species than the appetites of hunger and thirst." In a word, pity, gratitude, friendship, love, and patriotism, are founded on different benevolent affections; which our learned author holds to be original parts of the human constitution.

This reasoning has certainly great force; and if authority could have any weight in settling a question of this nature, we know not that name to which greater deference is due than the name of him from whom it is taken. Yet it must be confessed that the philosophers, who consider the affections and passions as early and deep-rooted associations, support their opinion with very plausible arguments. On their principles we have endeavoured elsewhere to account for the passions of fear and love, (see *INSTINCT* and *LOVE*); and we may here safely deny the truth of what has been stated respecting fear, which seems to militate against that account. We have attended with much solicitude to the actions of children; and have no reason to think that they feel terror on the brink of a precipice till they have been repeatedly warned of their danger in such situations by their parents or their keepers. Every person knows not only that they have no original or instinctive dread of fire, which is as dangerous to them as any precipice; but that it is extremely difficult to keep them from that destructive element till they are either capable of weighing the force of arguments, or have repeatedly experienced the pain of being burnt by it. With respect to sudden resentment, we cannot help considering the argument, which is brought in proof of its being instinctive, as proving the contrary in a very forcible manner. Instinct is some mysterious influence of God upon the mind exciting to actions of beneficial tendency: but can any benefit arise from wrecking our impotent vengeance on a flock or a stone? or is it supposable that a Being of infinite wisdom would excite us to actions so extravagantly foolish? We learn from experience to defend ourselves against rational or sensible enemies by retaliating the injuries which they inflict upon us; and if we have been often injured in any particular manner, the idea of that injury becomes in time so closely associated with the means by which it has been constantly repelled, that we never receive such an injury—a blow for instance—without being prompted to make the usual retaliation, without reflecting whether the object be sensible or insensible. So far from being instinctive does resentment appear to us, that

we think an attentive observer may easily perceive how the seeds of it are gradually intuled into the youthful mind; when the child, from being at first a timid creature shrinking from every pain, learns by degrees to return blow for blow and threat for threat.

But instead of urging what appears to ourselves of most weight against the instinctive system, we shall lay before our readers a few extracts from a dissertation on the Origin of the Passions by a writer whose elegance of language and ingenuity of investigation do honour to the school of Hartley.

"When an infant is born (says Dr Sayers*), there is every reason to suppose that he is born without ideas. These are rapidly communicated through the medium of the senses. The same senses are also the means of conveying to him pleasure and pain. These are the hinges on which the passions turn: and till the child is acquainted with these sensations, it would appear that no passion could be formed in his mind; for till he has felt pleasure and pain, how can he desire any object, or wish for its removal? How can he either love or hate? Let us observe then the manner in which love and hatred are formed; for on these passions depend all the rest. When a child endures pain, and is able to detect the cause of it, the idea of pain is connected in his mind with that of the thing which produced it; and if the object which occasioned pain be again presented to the child, the idea of pain associated with it arises also. This idea consequently urges the child to avoid or to remove the object; and thus arises the passion of dislike or hatred. In the same manner, the passion of liking or love is readily formed in the mind of a child from the association of pleasant ideas with certain objects which produced them.

"The passions of hope and fear are states of the mind depending upon the good or bad prospects of gratifying love or hatred; and joy or sorrow arises from the final success or disappointment which attends the exertions produced by love or by hatred. Out of these passions, which have all a perceptible relation to our own good, and are universally acknowledged to be selfish, all our other passions are formed."

To account for the passions called *disinterested*, he observes, that in the history of the human mind we find many instances of our dropping an intermediate idea, which has been the means of our connecting two other ideas together; and that the association of these two remains after the link which originally united them has vanished. Of this fact the reader will find sufficient evidence in different articles of this work (See *INSTINCT*, n° 19, and *METAPHYSICS*, n° 101: and, to apply it to the disinterested passions, let us suppose, with Dr Sayers, that any individual has done us as many offices of kindness, and has consequently contributed to our happiness; it is natural for us to seek with some anxiety for the continuance of those pleasures which he is able to communicate. But we soon discern, that the surest way of obtaining the continuance of his friendly offices is to make them, as much as possible, a source of pleasure to himself. We therefore do every thing in our power to promote his happiness in return for the good he has bestowed upon us, that thus we may attach him to us, so much as we are able. Hitherto all is perfectly selfish. We have been evidently endeavouring, for the sake of our own future

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* *Disquisitions Metaphysical and Literary.*

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gratification, to promote the happiness of this person: but observe the consequence. We have thus, by contemplating the advantage to be derived to ourselves from promoting the profecity of our friend, learned to associate a set of pleasant ideas with his happiness; but the link which has united them gradually escapes us, while the notion itself remains. Continuing to associate pleasure with the well-being of our friend, we endeavour to promote it for the sake of his *immediate* gratification, without looking further; and in this way his happiness, which was first attended to only as a means of future enjoyment, finally becomes an end. Thus then the passion which was originally selfish, is at length *disinterested*; its gratification being completed merely by its success in promoting the happiness of another."

In this way does our author account for the origin of gratitude; which at last becomes a habit, and flows spontaneously towards every man who has either been or intended to be our benefactor. According to him, it is easy to observe also, that from associating pleasure with the happiness of an individual when we procure it ourselves, it must of course soon follow, that we should experience pleasure from a view of his happiness any way produced; such happiness raising at all times pleasant ideas when it is presented to our minds. This is another feature of a disinterested affection, to feel delight from the mere increase of happiness in the object whom we love.

"It may be objected, perhaps, that parents seem to have an *instinctive* disinterested love of their offspring: but surely the love of a parent (A) for a new-born infant is not usually equal to that for a child of four or five years old. When a child is first born, the prospect and hopes of future pleasure from it are sufficient to make a parent anxious for its preservation. As the child grows up, the hope of future enjoyment from it must increase: hence would pleasure be associated with the well-being of the child, the love of which would of course become in due time disinterested."

Our author does not analyse *pity*, and trace it to its source in selfishness; but he might easily have done it, and it has been ably done by his matter. Pity or compassion is the uneasiness which a man feels at the misery of another. It is generated in every mind during the years of childhood; and there are many circumstances in the constitution of children, and in the mode of their education, which make them particularly susceptible of this passion. The very appearance of any kind of misery which they have experienced, or of any signs of distress which they understand, excite

in their minds painful feelings, from the remembrance of what they have suffered, and the apprehension of their suffering it again. We have seen a child a year old highly entertained with the noise and struggles made by its elder brother when plunged naked into a vessel filled with cold water. This continued to be the case for many days, till it was thought proper to plunge the younger as well as the elder; after which the daily entertainment was soon at an end. The little creature had not been itself plunged above twice till it ceased to find diversion in its brother's sufferings.— On the third day it cried with all the symptoms of the bitterest anguish upon seeing its brother plunged, though no preparation was then made for plunging itself: but surely this was not disinterested sympathy, but a feeling wholly selfish, excited by the remembrance of what it had suffered itself, and was apprehensive of suffering again. In a short time, however, the painful feelings accompanying the sight of its brother's struggles, and the sound of his cries, were doubtless so associated with that sight and that sound, that the appearance of the latter would have brought the former along with them, even though the child might have been no longer under apprehension of a plunging itself. This association, too, would soon be transferred to every boy in the same circumstances, and to similar sounds and struggles, from whatever cause they might proceed.

Thus, as Dr Hartley observes §, "when several children are educated together, the pains, the denials of pleasure, and the sorrows which affect one, generally extend to all in some degree, often in an equal one. When their parents, companions, or attendants are sick or afflicted, it is usual to raise in their minds the nascent ideas of pains and miseries by such words and signs as are suited to their capacities. They also find themselves laid under many restraints, on account of the sickness or affliction of others; and when these and such like circumstances have raised in their minds desires to remove the causes of their own internal feelings, i.e. to ease the miseries of others, a variety of internal feelings and desires become so blended and associated together, as that no part can be distinguished separately from the rest, and the child may properly be said to have compassion. The same sources of compassion remain, though with some alteration, during our whole progress through life. This is so evident, that a reflecting person may plainly discern the constituent parts of his compassion while they are yet the mere internal and, as one may say, selfish feelings above-mentioned; and before they have put on the nature of com-

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§ Observation on Man.

(A) That this is true of the father is certain; but it may be questioned whether it be equally true of the mother. A woman is no sooner delivered of her infant, than she caresses it with the utmost possible fondness. We believe, that if she were under the necessity of making a choice between her child of four years, and her infant an hour old, she would rather be deprived of the latter than of the former; but we are not convinced that this would proceed from a less degree of affection to the infant than to the child. She knows that the child has before his fourth year escaped many dangers which the infant must encounter, and may not escape; and it is therefore probable that her choice would be the result of prudent reflection. Though we are not admirers of that philosophy which supposes the human mind a bundle of instincts, we can as little approve of the opposite scheme, which allows it no instincts at all. The *sympathy* of a mother to her new-born infant is undoubtedly instinctive, as the only thing which at that moment can be associated with it in her mind is the pain she has suffered in bringing it to the world.

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compassion, by coalescence with the rest. Agreeably to this method of reasoning, it may be observed, that persons whose nerves are easily irritable, and those who have experienced great trials and afflictions, are in general more disposed to compassion than others; and that we are most apt to pity others in those diseases and calamities which we either have felt or of which we apprehend ourselves to be in danger."

The origin of patriotism and public spirit is thus traced by Dr Sayers: "The pleasures which our country affords are numerous and great. The wish to perpetuate the enjoyment of those pleasures, includes the wish to promote the safety and welfare of our country, without which many of them would be lost. All this is evidently selfish; but, as in the progress of gratitude, it finally becomes disinterested. Pleasant ideas are thus strongly connected with the welfare of our country, after the tie which first bound them together has escaped our notice. The prosperity which was at first desirable as the means of future enjoyment, becomes itself an end: we feel delight in such prosperity, however produced; and we look not beyond this immediate delight. It is thus not difficult to observe in what manner a general and disinterested benevolence takes place in a mind which has already received pleasure from the happiness of a few: the transition is easy towards associating it with *happiness in general*, with the happiness of any being, whether produced by ourselves or by any other cause whatever."

From this reasoning, our author concludes, that all our passions may be traced up to original feelings of regard for ourselves. "Thus (in the forcible language of a learned writer ‡ of the same school) does self-love, under the varying appearance of natural affection, domestic relation, and the connections of social habitude, at first work blindly on, obscure and deep, in dirt: But as it makes its way, it continues rising, till it emerges into light; and then suddenly expiring, leaves behind it the fairest issue,"—benevolent affection.

Self-love forsook the path it first pursu'd,
And found the private in the public good.

Thus have we stated the two opposite theories respecting the origin of passions in the mind, and given our readers a short specimen of the reasonings by which they are supported by their respective patrons. Were we called upon to decide between them, we should be tempted to say, that they have both been carried to extremes by some of their advocates, and that the truth lies in the middle between them. "It is impossible * but that creatures capable of pleasant and painful sensations, should love and choose the one, and dislike and avoid the other. No being who knows what happiness and misery are, can be supposed indifferent to them, without a plain contradiction. Pain is not a *possible* object of desire, nor happiness of *aversion*." To prefer a greater good though distant, to a less good that is present; or to choose a present evil, in order to avoid a greater future evil—is indeed wise and rational conduct; but to choose evil ultimately, is absolutely impossible. Thus far then must be admitted, that every being possessed of sense and intellect, necessarily desires his own good as soon as he knows what it is; but if this knowledge be not innate, neither can the desire. Every human being comes into the world

with a capability of knowledge, and of course with a capability of affections, desires, and passions: but it seems not to be conceivable how he can actually love, or hate, or dread any thing, till he know whether it be good, or ill, or dangerous. If, therefore, we have no innate ideas, we cannot possibly have innate desires or aversions. Those who contend that we have, seem to think, that without them reason would be insufficient, either for the preservation of the individual or the continuation of the species; and some writers have alleged, that if our affections and passions were the mere result of early associations, they would necessarily be more capricious than we ever find them. But this objection seems to arise from their not rightly understanding the theory of their antagonists. The disciples of Locke and Hartley do not suppose it possible for any man in society to prevent such associations from being formed in his mind as shall necessarily produce desires and aversions; far less do they think it possible to form associations of ideas utterly repugnant, so as to desire that as good which his senses and intellect have experienced to be evil. Associations are formed by the very same means, and at the very same time, that ideas and notions are impressed upon the mind; but as pain is never mistaken for pleasure by the senses, so an object which has given us only pain, is never associated with any thing that makes it desirable. We say an object that has given us only pain, because it is possible to form such an association between life and the loss of a limb, as to make us grateful to the surgeon by whom it was amputated. Associations being formed according to the same laws by which knowledge is acquired, it by no means follows that passions resulting from them should be more capricious than they are found to be; and they certainly are sufficiently capricious to make us suspect that the greater part of them has this origin, rather than that they are all infused into the mind by the immediate agency of the Creator. If man be a being formed with no innate ideas, and with no other instinctive principles of action than what are absolutely necessary to preserve his existence and perpetuate the species, it is easy to perceive why he is placed in this world as in a state of probation, where he may acquire habits of virtue to fit him for a better. It is likewise easy to perceive why some men are better than others, and why some are the slaves of the most criminal passions. But all this is unintelligible, upon the supposition that the seeds of every passion are innate, and that man is a compound of reason and of instincts so numerous and various as to suit every circumstance in which he can be placed.

If passions, whatever be their origin, operate instantaneously, and if they be formed according to fixed laws, it may be thought a question of very little importance whether they be instinctive or acquired.—This was long our own opinion; but we think, that upon maturer reflection we have seen reason to change it. If passions be the result of early associations, it is of the utmost consequence that no improper associations be formed in the minds of children, and that none of their unreasonable desires be gratified. Upon this theory it seems indeed to depend almost wholly upon education, whether a child shall become a calm, benevolent, steady, and upright man; or a passionate, capricious,

Passion.

‡ Warburton.

* Dr Price's Review, &c.

prisons, selfish, miscreant. By teaching him to resent every petty injury, the seeds of irascibility are sown in his mind, and take fresh root, that before the age of maturity he becomes intolerant to all with whom he must converse. By exciting his humblest desires in his youthful mind, and making every gratifying thing, you make him capricious, and impatient of disappointment; and by representing other children as in any degree inferior to him, you inspire him with the hateful passion of pride. According to the instinctive theory, education can only augment or diminish the strength of passions; according to the other theory, it is the source of by far the greater part of them. On either supposition, parents should watch with solicitude over the actions of their children; but they will surely think themselves obliged to be doubly watchful, if they believe, that through their neglect their children may acquire hateful passions, to which, if properly educated, they might have remained strangers thro' their whole lives. And let it be remembered, that this solicitude should begin at an early period; because the mind is susceptible of deep associations much sooner than is sometimes imagined. Without this susceptibility, no language could be learned; and therefore a child by the time he learns to speak, may have planted in his mind the seeds of passions, on the just regulation and subordination of which depends in a great measure the happiness of our kind. See *Modern Philosophy*, Part I. Chap. 1, & 2. Part III. n^o 216.

Passions and Emotions, difference between them. See *Emotions and Passions*.

External Signs of Emotions and Passions. So intimately connected are the soul and body, that every agitation in the former produces a visible effect upon the latter. There is, at the same time, a wonderful uniformity in that operation; each class of emotions and passions being invariably attended with an external appearance peculiar to itself. These external appearances, or signs, may not improperly be considered as a natural language, expressing to all beholders emotions and passions as they arise in the heart. Hope, fear, joy, grief, are displayed externally: the character of a man can be read in his face; and beauty, which makes so deep an impression, is known to result, not so much from regular features and a fine complexion, as from good-nature, goodness, sprightliness, sweetness, or other mental quality, expressed upon the countenance. Though perfectly blind in that language he rare, yet what is generally known is sufficient for the ordinary purposes of life. But by what means we come to understand the language, is a point of some intricacy. It cannot be taught merely; for upon the most attentive inspection of the human visage, all that can be discerned are, figure, colour, and motion, which, singly or combined, never can represent a passion nor a sentiment: the external sign is indeed visible; but to understand its meaning, we must be able to connect it with the passion that causes it; an operation far beyond the reach of insight. Where then is the instructor to be found that can reveal this secret connection? If we apply to experience, it is yielded, that from long and diligent observation, we may gather, in some measure, in what manner things we are acquainted with express their passions externally; but with respect to

strangers, we are left in the dark; and yet we are not puzzled about the meaning of these external expressions in a stranger, more than in a bosom-companion. Further, had we no other means but experience for understanding the external signs of passion, we could not expect any uniformity, nor any degree of skill, in the bulk of individuals: yet matters are so much better ordered, that the external expressions of passion form a language understood by all, by the young as well as the old, by the ignorant as well as the learned: We talk of the plain and legible characters of that language; for undoubtedly we are much indebted to experience, in deciphering the dark and more delicate expressions. Where then shall we apply for a solution of this intricate problem, which seems to penetrate deep into human nature? Undoubtedly if the meaning of external signs be not derived to us from sight, nor from experience, there is no remaining source whence it can be derived but from nature.

We may then venture to pronounce, with some degree of confidence, that man is provided by nature with a sense or faculty that lays open to him every passion by means of its external expressions. And we cannot entertain any reasonable doubt of this, when we reflect, that the meaning of external signs is not hid even from infants: an infant is remarkably affected with the passions of its nurse expressed on her countenance; a smile cheers it, a frown makes it afraid: but fear cannot be without apprehending danger; and what danger can the infant apprehend, unless it be sensible that its nurse is angry? We must therefore admit, that a child can read anger in its nurse's face; of which it must be sensible intuitively, for it has no other mean of knowledge. We do not affirm, that these particulars are clearly apprehended by the child; for to produce clear and distinct perceptions, reflection and experience are requisite: but that even an infant, when afraid, must have some notion of its being in danger, is evident.

That we should be conscious intuitively of a passion from its external expressions, is conformable to the analogy of nature: the knowledge of that language is of too great importance to be left upon experience; because a foundation so uncertain and precarious, would prove a great obstacle to the formation of societies. Wisely therefore is it ordered, and agreeably to the system of providence, that we should have nature for our instructor.

Such is the philosophy of Lord Kames, to which objections unanswerable may be made. It is part of the instinctive system of metaphysics, which his Lordship has carried farther than all who wrote before him, and perhaps farther than all who have succeeded him in this department of science. That a child intuitively reads anger in its nurse's face, is so far from being true, that for some short time after birth it is not terrified by the most menacing gestures. It is indeed absolutely incapable of fear till it has suffered pain, (see *Instinct*); and could we constantly carefs it with what is called an *angry look*, it would be cheered by that look, and frightened at a smile. It feels, however, the *effects* of anger, and is soon capable of observing the peculiarity of feature with which that passion is usually accompanied; and these two become in a short time so linked together in its tender mind, that

Passion. that the appearance of the one necessarily suggests to it the reality of the other.

Should it be said that a loud and sudden noise startles a child immediately after birth, and that, therefore, the infant must be instinctively afraid, the fact may be admitted, without any necessity of admitting the inference. The nerves of an infant are commonly very irritable, and the strong impulse on the auditory nerves may agitate its whole frame, without inspiring it with the passion of fear. The loud noise is, in all probability, not the sign of approaching danger, but the immediate cause of real pain, from which the infant shrinks, as it would from the prick of a pin, or the scorching of a candle. But we have said enough in the article immediately preceding, and in others which are there quoted, to show how the passions may be formed by associations even in early infancy, and yet operate as if they were instinctive. This being the case, we shall through the remainder of this article suffer his Lordship to speak his own language, without making any further remarks upon it. We are induced to do this for two reasons; of which the first is, that many of our readers will probably prefer his theory to ours; and the second is, that his conclusions respecting the signs and language of passion hold equally good from either theory.

We perfectly agree with him, that manifold and admirable are the purposes to which the external signs of passion are made subservient by the Author of our nature.

1. The signs of internal agitation displayed externally to every spectator, tend to fix the signification of many words. The only effectual means to ascertain the meaning of any doubtful word, is an appeal to the thing it represents: and hence the ambiguity of words expressive of things that are not objects of external sense; for in that case an appeal is denied. Passion, strictly speaking, is not an object of external sense: but its external signs are: and by means of these signs, passions may be appealed to with tolerable accuracy: thus the words that denote our passions, next to those that denote external objects, have the most distinct meaning. Words signifying internal action and the more delicate feelings, are less distinct. This defect, with regard to internal action, is what chiefly occasions the intricacy of logic: the terms of that science are far from being sufficiently ascertained, even after much care and labour bestowed by an eminent writer*; to whom, however, the world is greatly indebted, for removing a mountain of rubbish, and moulding the subject into a rational and correct form. The same defect is remarkable in criticism, which has for its object the more delicate feelings; the terms that denote these feelings being not more distinct than those of logic.

2. Society among individuals is greatly promoted by that universal language. Looks and gestures give direct access to the heart; and lead us to select, with tolerable accuracy, the persons who are worthy of our confidence. It is surprising how quickly, and for the most part how correctly, we judge of character from external appearance.

3. After social intercourse is commenced, these external signs, which diffuse through a whole assembly the feelings of each individual, contribute above all

other means to improve the social affections. Language, no doubt, is the most comprehensive vehicle for communicating emotions: but in expedition, as well as in power of conviction, it falls short of the signs under consideration; the involuntary signs especially, which are incapable of deceit. Where the countenance, the tones, the gestures, the actions, join with the words in communicating emotions, these united have a force irresistible. Thus all the pleasant emotions of the human heart, with all the social and virtuous affections, are, by means of these external signs, not only perceived, but felt. By this admirable contrivance, conversation becomes that lively and animating amusement, without which life would at best be insipid: one joyful countenance spreads cheerfulness instantaneously through a multitude of spectators.

4. Dissocial passions, being hurtful by prompting violence and mischief, are noted by the most conspicuous external signs, in order to put us upon our guard: thus anger and revenge, especially when sudden, display themselves on the countenance in legible characters. The external signs, again, of every passion that threatens danger, raise in us the passion of fear, which frequently operating without reason or reflection, moves us by a sudden impulse to avoid the impending danger.

5. These external signs are remarkably subservient to morality. A painful passion, being accompanied with disagreeable external signs, must produce in every spectator a painful emotion: but then, if the passion be social, the emotion it produces is attractive, and connects the spectator with the person who suffers. Dissocial passions only are productive of repulsive emotions, involving the spectator's aversion, and frequently his indignation. This artful contrivance makes us cling to the virtuous, and abhor the wicked.

6. Of all the external signs of passion, those of affliction or distress are the most illustrious with respect to a final cause, and deservedly merit a place of distinction. They are illustrious by the singularity of their contrivance; and also by inspiring sympathy, a passion to which human society is indebted for its greatest blessing, that of providing relief for the distressed. A subject so interesting deserves a leisurely and attentive examination. The conformity of the nature of man to his external circumstances is in every particular wonderful: his nature makes him prone to society; and society is necessary to his well-being, because in a solitary state he is a helpless being, destitute of support, and in his distresses destitute of relief: but mental support, the shining attribute of society, is of too great moment to be left dependent upon cool reason; it is ordered more wisely, and with greater conformity to the analogy of nature, that it should be enforced even instinctively by the passion of sympathy. Here sympathy makes a capital figure; and contributes, more than any other means, to make life easy and comfortable. But however essential the sympathy of others may be to our well-being, one beforehand would not readily conceive how it could be raised by external signs of distress: for considering the analogy of nature, if these signs be agreeable, they must give birth to a pleasant emotion leading every beholder to be pleased with human woes: if disagreeable, as they undoubtedly are, ought they not naturally

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naturally to repel the spectator from them, in order to be relieved from pain? Such would be the reasoning butch and; and such would be the effect were man purely a selfish being. But the benevolence of our nature gives a very different direction to the painful passion of sympathy, and to the desire involved in it: instead of avoiding distress, we fly to it in order to afford relief; and our sympathy cannot be otherwise gratified but by giving ad the succour in our power. Thus external signs of distress, though disagreeable, are attractive; and the sympathy they inspire is a powerful cause, impelling us to afford relief even to a stranger, as if he were our friend or relation.

It is a noted observation, that the deepest tragedies are the most crowded: which in an overly view will be thought an unaccountable bias in human nature. Love of novelty, desire of occupation, beauty of action, make us fond of theatrical representations; and when once engaged, we must follow the story to the conclusion, whatever distress it may create. But we generally become wise by experience; and when we reflect what pain we shall suffer during the course of the representation, it is not surprising that persons of reflection do not avoid such spectacles altogether? And yet one who has scarce recovered from the distress of a deep tragedy, resolves coolly and deliberately to go to the very next, without the slightest obstruction from self love. The whole mystery is explained by a single observation: That sympathy, though painful, is attractive; and attaches us to an object in distress, in stead of prompting us to fly from it. And by this curious mechanism it is, that persons of any degree of sensibility are attracted by affliction still more than by joy.

To conclude: the external signs of passion are a strong indication, that man, by his very constitution, is framed to be open and sincere. A child, in all things obedient to the impulses of nature, hides none of its emotions; the savage and clown, who have no guide but pure nature, expose their hearts to view, by giving way to all the natural signs. And even when men learn to dissemble their sentiments, and when behaviour degenerates into art, there still remain checks, that keep dissimulation within bounds; and prevent a great part of its mischievous effects: the total suppression of the voluntary signs during any vivid passion, begets the utmost uneasiness, which cannot be endured for any considerable time: this operation becomes indeed less painful by habit; but luckily the involuntary signs cannot, by any effort, be suppressed nor even dissimulated. An absolute hypocrisy, by which the character is concealed and a fictitious one assumed, is made impracticable; and nature has thereby prevented much harm to society. We may pronounce, therefore, that Nature, herself sincere and candid, intends that mankind should preserve the same character, by cultivating simplicity and truth, and banishing every sort of dissimulation that tends to mischief.

Influence of Passions with respect to our Perceptions, Opinions, and Belief. So intimately are our perceptions, passions, and actions, connected, it would be wondered if they should have no mutual influence. That our actions are too much influenced by passion, is a known truth; but it is not less certain, though not so

well known, that passion hath also an influence upon our perceptions, opinions, and belief. For example, the opinions we form of men and things are generally directed by affection: An advice given by a man of figure hath great weight; the same advice from one in a low condition is despised or neglected: a man of courage under-rates danger; and to the indolent the slightest obstacle appears unsurmountable. All this may be accounted for by the simple principle of association.

There is no truth more universally known, than that tranquillity and sedateness are the proper state of mind for accurate perception and cool deliberation; and for that reason, we never regard the opinion even of the wisest man, when we discover prejudice or passion behind the curtain. Passion hath such influence over us, as to give a false light to all its objects. Agreeable passions prepossess the mind in favour of their objects; and disagreeable passions, not less against their objects: A woman is all perfection in her lover's opinion, while in the eye of a rival beauty she is awkward and disagreeable: when the passion of love is gone, beauty vanishes with it;—nothing is left of that genteel motion, that sprightly conversation, those numberless graces, which formerly, in the lover's opinion, charmed all hearts. To a zealot every one of his own sect is a saint, while the most upright of a different sect are to him children of perdition: the talent of speaking in a friend, is more regarded than prudent conduct in any other. Nor will this surprise any one acquainted with the world; our opinions, the result frequently of various and complicated views, are commonly so slight and wavering, as readily to be susceptible of a bias from passion.

With that natural bias another circumstance concurs, to give passion an undue influence on our opinions and belief; and that is a strong tendency in our nature to justify our passions as well as our actions, not to others only, but even to ourselves. That tendency is peculiarly remarkable with respect to disagreeable passions: by its influence, objects are magnified or lessened, circumstances supplied or suppressed, every thing coloured and disguised, to answer the end of justification. Hence the foundation of self deceit, where a man imposes upon himself innocently, and even without suspicion of a bias.

We proceed to illustrate the foregoing observations by proper examples.

Gratitude, when warm, is often exerted upon the children of the benefactor; especially where he is removed out of reach by death or absence. The passion in this case being exerted for the sake of the benefactor, requires no peculiar excellence in his children: but the practice of doing good to these children produces affection for them, which never fails to advance them in our esteem. By such means, strong connections of affection are often formed among individuals, upon the slight foundation now mentioned.

Envy is a passion, which, being altogether unjustifiable, cannot be excused but by disguising it under some plausible name. At the same time, no passion is more eager than envy to give its object a disagreeable appearance: it magnifies every bad quality, and fixes on the most humbling circumstances:

Passion.

Passion.

Cassius. I cannot tell what you and other men
Think of this life ; but for my single self,
I had as lief not be, as live to be
In awe of such a thing as I myself.
I was born free as Cæsar, so were you ;
We both have fed as well ; and we can both
Endure the winter's cold as well as he.
For once, upon a raw and gusty day,
The troubled Tyber chafing with his shores,
Cæsar says to me, Dar'st thou, Cæsius, now
Leap in with me into this angry flood,
And swim to yonder point ?—Upon the word,
Accoutred as I was, I plunged in,
And bid him follow ; so indeed he did.
The torrent roar'd, and we did buffet it
With lusty sinews ; throwing it aside,
And stemming it with hearts of controversy.
But ere we could arrive the point propos'd,
Cæsar cry'd, Help me, Cassius, or I sink.
I, as Æneas, our great ancestor,
Did from the flames of Troy upon his shoulder
The old Anchises bear ; so from the waves of Tyber
Did I the tired Cæsar : and this man
Is now become a god ; and Cassius is
A wretched creature, and must bend his body
If Cæsar carelessly but nod on him.
He had a fever when he was in Spain ;
And when the fit was on him, I did mark
How he did shake. 'Tis true, this god did shake ;
His coward lips did from their colour fly ;
And that same eye whose bend doth awe the world
Did lose its lustre : I did hear him groan ;
Ay, and that tongue of his, that bade the Romans
Mark him, and write his speeches in their books,
Alas ! it cry'd—Give me some drink, Titinius,—
As a sick girl. Ye gods, it doth amaze me,
A man of such a feeble temper should
So get the start of the majestic world,
And bear the palm alone. *Julius Cæsar, act. 1. sc. 3.*

Gloster, inflamed with resentment against his son
Edgar, could even force himself into a momentary
conviction that they were not related :

O strange fallen'd villain !

Would he deny his letter ?—I never got him.

King Lear, act 2. sc. 3.

When by great sensibility of heart, or other means,
grief becomes immoderate, the mind, in order to justify
itself, is prone to magnify the cause ; and if the
real cause admit not of being magnified, the mind seeks
a cause for its grief in imagined future events :

Busby. Madam, your majesty is much too sad :
You promis'd, when you parted with the king,
To lay aside self-harming heaviness,
And entertain a cheerful disposition.

Queen. To please the king, I did ; to please myself,
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I cannot do it. Yet I know no cause
Why I should welcome such a guest as grief ;
Save bidding farewell to so sweet a guest
As my sweet Richard : yet again, methinks,
Some unborn sorrow, ripe in Fortune's womb,
Is coming tow'rd me ; and my inward soul
With something trembles, yet at nothing grieves,
More than with parting from my lord the king.

Richard II. act 2. sc. 5.

Resentment at first is vented on the relations of the
offender, in order to punish him : but as resentment,
when so outrageous, is contrary to conscience, the
mind, to justify its passion, is disposed to paint these
relations in the blackest colours ; and it comes at last
to be convinced, that they ought to be punished for
their own demerits.

Anger, raised by an accidental stroke upon a tender
part of the body, is sometimes vented upon the un-
designing cause. But as the passion in that case is ab-
surd, and as there can be no solid gratification in pu-
nishing the innocent, the mind, prone to justify as well
as to gratify its passion, deludes itself into a convic-
tion of the action's being voluntary. The conviction,
however, is but momentary ; the first reflection shows
it to be erroneous : and the passion vanisheth almost
instantaneously with the conviction. But anger, the
most violent of all passions, has still greater influence :
it sometimes forces the mind to personify a stock or a
stone if it happen to occasion bodily pain, and even to
believe it a voluntary agent, in order to be a proper
object of resentment. And that we have really a mo-
mentary conviction of its being a voluntary agent,
must be evident from considering, that without such
conviction the passion can neither be justified nor gra-
tified : the imagination can give no aid ; for a stock
or a stone imagined insensible, cannot be an object of
punishment, if the mind be conscious that it is an ima-
gination merely without any reality (A). Of such
personification, involving a conviction of reality, there
is one illustrious instance. When the first bridge of
boats over the Hellespont was destroyed by a storm,
Xerxes fell into a transport of rage, so excessive, that
he commanded the sea to be punished with 300 stripes ;
and a pair of fetters to be thrown into it, enjoining the
following words to be pronounced : " O thou salt and
bitter water ! thy master hath condemned thee to this
punishment for offending him without cause ; and is
resolved to pass over thee in despite of thy insolence :
with reason all men neglect to sacrifice to thee, because
thou art both disagreeable and treacherous."

Herodotus, lib. 7.

Shakespeare exhibits beautiful examples of the ir-
regular influence of passion in making us believe things
to be otherwise than they are. King Lear, in his dis-
tress, personifies the rain, wind, and thunder ; and in
order to justify his resentment, believes them to be tak-
ing part with his daughters :

B

Lear.

(A) We have already shown how a man may be instigated to wreck his vengeance on a stock or a stone, without ever considering whether it be sensible or insensible : (See PASSION). If the story of Xerxes be true, he may have considered the sea as sensible and animated, without dreaming that a stock or a stone is so. The sea was a god among many of the pagans, and was considered as such by Xerxes, or he could not have applauded men for not sacrificing to it.

Passion.

Leaz. Rattle thy bellyful, spit fire, spout rain!
 Not rain, wind, thunder, fire, are my daughters.
 I tax not you, ye elements, with unkindeless;
 I never gave you know'ers, call'd you children;
 You owe me no subscription. Then let talk
 Your horrible pleasure.—Here I stand, your brave;
 A poor, infirm, weak, and despis'd old man!
 But yet I'll you serve ministers,
 That have with two pernicious daughters join'd
 Your high engender'd battles 'gainst a head
 So old and white as this. Oh! oh! 'tis foul!

Act 3. sc. 2.

King Richard, full of indignation against his favourite
 horie for carrying Bolingbroke, is led into the con-
 viction of his being rational:

Groom. O, how it yearn'd my heart, when I beheld
 In London streets, that coronation-day,
 When Bolingbroke rode on Roan Barbary,
 That horse that then so often hast bestid,
 That horse that I so carefully have dress'd.

K. Rich. Rode he on Barbary? tell me, gentle friend,
 How went he under him?

Groom. So proudly as he had disdain'd the ground.

K. Rich. So proud that Bolingbroke was on his back!
 That jade had eat bread from my royal hand.
 This hand hath made him proud with clapping him.
 Would he not stum'ble? would he not fall down,
 (Since pride must have a fall, and break the neck
 Of that proud man that did usurp his back?)

Richard II. act 3. sc. 11.

Hamlet, swelled with indignation at his mother's second marriage, was strongly inclined to lessen the time of her widowhood, the shortness of the time being a violent circumstance against her; and he deludes himself by degrees into the opinion of an interval shorter than the real one:

Hamlet. ——— That it should come to this!
 But two months dead! nay, not so much; not two—
 So excellent a king, that was, to this,
 Hyperion to a satyr: so loving to my mother,
 That he permitted not the wind of heav'n
 Visit her face too roughly. Heav'n and earth!
 Must I remember—why, she would hang on him,
 As if increase of appetite had grown
 By what it fed on: yet, within a month—
 Let me not think—Frailty, thy name is *Woman!*
 A little month! or ere those shoes were old,
 With which she follow'd my poor father's body,
 Like Niobe, all tears—why she, ev'n she—
 (O heav'n! a beast, that wants discourse of reason,
 Wou'd have mourn'd longer) married with mine uncle,
 My father's brother; but no more like my father
 Than I to Hercules. Within a month!—
 Ere yet the salt of most unrighteous tears
 Had left the flushing in her galled eyes,
 She married—Oh, most wicked speed! to post
 With such dexterity to incestuous sheets!
 It is not, nor it cannot, come to good,
 But break my heart, for I must hold my tongue.

Act 1. sc. 3.

The power of passion to falsify the computation of time is remarkable in this instance; because time, which hath an accurate measure, is less obsequious to our de-

sires and wishes, than objects which have no precise standard of less or more.

Good news are greedily swallowed upon very slender evidence; our wishes magnify the probability of the event, as well as the veracity of the relater; and we believe as certain what at best is doubtful:

Quel, che l'huom vede, amor li fa invisibile
 E l'invisibile veder amore.

Questo creduto fu, che 'l miser suole

Dar facile credenza a' quel, che vuole.

Orlando. Furijs. cant. 1. st. 56.

For the same reason, bad news gain also credit upon the slightest evidence: fear, if once alarmed, has the same effect with hope, to magnify every circumstance that tends to conviction. Shakspeare, who shows more knowledge of human nature than any of our philosophers, hath in his *Cymbeline* represented this bias of the mind; for he makes the person who alone was affected with the bad news, yield to evidence that did not convince any of his companions. And *Othello* is convinced of his wife's infidelity from circumstances too slight to move any person less interested.

If the news interest us in so low a degree as to give place to reason, the effect will not be altogether the same: judging of the probability or improbability of the story, the mind settles in a rational conviction either that it is true or not. But even in that case, the mind is not allowed to rest in that degree of conviction which is produced by rational evidence: if the news be in any degree favourable, our belief is raised by hope to an improper height; and if unfavourable, by fear.

This observation holds equally with respect to future events: if a future event be either much wished or dreaded, the mind never fails to augment the probability beyond truth.

That easiness of belief, with respect to wonders and prodigies, even the most absurd and ridiculous, is a strange phenomenon; because nothing can be more evident than the following proposition, That the more singular any event is, the more evidence is required to produce belief: a familiar event daily occurring, being in itself extremely probable, finds ready credit, and therefore is vouched by the slightest evidence; but to overcome the improbability of a strange and rare event, contrary to the course of nature, the very strongest evidence is required. It is certain, however, that wonders and prodigies are swallowed by the vulgar, upon evidence that would not be sufficient to ascertain the most familiar occurrence. It has been reckoned difficult to explain that irregular bias of mind; but we are now made acquainted with the influence of passion upon opinion and belief; a story of ghosts or fairies, told with an air of gravity and truth, raiseth an emotion of wonder, and perhaps of dread; and these emotions imposing on a weak mind, impress upon it a thorough conviction contrary to reason.

Opinion and belief are influenced by propensity as well as by passion. An innate propensity is all we have to convince us that the operations of nature are uniform: influenced by that propensity, we often rashly think, that good or bad weather will never have an end; and in natural philosophy, writers, influenced by the same propensity, stretch commonly their analogical reason-

Passion.

Passion. reasonings beyond just bounds. See METAPHYSICS, n^o 133, 134.

Opinion and belief are influenced by affection as well as by propensity. The noted story of a fine lady and a curate-viewing the moon through a telescope is a pleasant illustration: "I perceive (says the lady) two shadows inclining to each other; they are certainly two happy lovers;" "Not at all (replies the curate), they are two steeples of a cathedral."

Language of Passion. Among the particulars that compose the social part of our nature, a propensity to communicate our opinions, our emotions, and every thing that affects us, is remarkable. Bad fortune and injustice affect us greatly; and of these we are so prone to complain, that if we have no friend nor acquaintance to take part in our sufferings, we sometimes utter our complaints aloud, even where there are none to listen.

But this propensity operates not in every state of mind. A man immoderately grieved, seeks to afflict himself, rejecting all consolation: immoderate grief accordingly is mute; complaining is struggling for consolation.

It is the wretch's comfort still to have
Some small reserve of near and inward wo,
Some unsuspected hoard of inward grief,
Which they unseen may wail, and weep, and mourn,
And glutton-like alone devour.

Mourning Bride, act 1. sc. 1.

When grief subsides, it then, and no sooner, finds a tongue: we complain, because complaining is an effort to disburden the mind of its distress. This observation is finely illustrated by a story which Herodotus records, *b. 3.* Cambyfes, when he conquered Egypt, made Psammeticus the king prisoner; and for trying his constancy, ordered his daughter to be dressed in the habit of a slave, and to be employed in bringing water from the river; his son also was led to execution with a halter about his neck. The Egyptians vented their sorrow in tears and lamentations: Psammeticus only, with a downcast eye, remained silent. Afterward meeting one of his companions, a man advanced in years, who, being plundered of all, was begging alms, he wept bitterly, calling him by his name. Cambyfes, struck with wonder, demanded an answer to the following question: "Psammeticus, thy master Cambyfes is desirous to know, why, after thou hadst seen thy daughter so ignominiously treated, and thy son led to execution, without exclaiming or weeping, thou shouldst be so highly concerned for a poor man, noway related to thee?" Psammeticus returned the following answer: "Son of Cyrus, the calamities of my family are too great to leave me the power of weeping; but the misfortunes of a companion, reduced in his old age to want of bread, is a fit subject for lamentation."

Surprise and terror are silent passions, for a different reason: they agitate the mind so violently, as for a time to suspend the exercise of its faculties, and among others the faculty of speech.

Love and revenge, when immoderate, are not more loquacious than immoderate grief. But when these passions become moderate, they set the tongue free, and, like moderate grief, become loquacious. Moderate love, when unsuccessful, is vented in complaints;

when successful, is full of joy expressed by words and gestures.

As no passion hath any long uninterrupted existence, nor beats always with an equal pulse, the language suggested by passion is not only unequal but frequently interrupted: and even during an uninterrupted fit of passion, we only express in words the more capital sentiments. In familiar conversation, one who vents every single thought, is justly branded with the character of *loquacity*; because sensible people express no thoughts but what make some figure: in the same manner, we are only disposed to express the strongest impulses of passion, especially when it returns with impetuosity after interruption.

It is elsewhere observed * that the sentiments ought to be tuned to the passion, and the language to both. Elevated sentiments require elevated language: tender sentiments ought to be clothed in words that are soft and flowing: when the mind is depressed with any passion, the sentiments must be expressed in words that are humble, not low. Words being intimately connected with the ideas they represent, the greatest harmony is required between them: to express, for example, an humble sentiment in high-sounding words, is disagreeable by a discordant mixture of feelings; and the discord is not less when elevated sentiments are dressed in low words:

Veribus exponi tragicis res comica non vult.

Indignatur item privatis ac prope focco

Dignis carminibus narrari cœna Thyestæ.

Horat. Ars poet. l. 89.

This, however, excludes not figurative expression, which, within moderate bounds, communicates to the sentiment an agreeable elevation. We are sensible of an effect directly opposite, where figurative expression is indulged beyond a just measure: the opposition between the expression and the sentiment makes the discord appear greater than it is in reality.

At the same time, figures are not equally the language of every passion: pleasant emotions, which elevate or swell the mind, vent themselves in strong epithets and figurative expression; but humbling and dispiriting passions affect to speak plain:

Et tragicus plerumque dolet sermone pedestri.

Telephus et Peleus, cum pauper et exul uterque,

Projicit ampullas et sesquipedalia verba,

Si curat cor spectantis tetigisse querela.

Horat. Ars poet. 95.

Figurative expression, being the work of an enlivened imagination, cannot be the language of anguish or distress. Otway, sensible of this, has painted a scene of distress in colours finely adapted to the subject: there is scarce a figure in it, except a short and natural simile with which the speech is introduced. Belvidera, talking to her father of her husband:

Think you saw what past at our last parting;

Think you beheld him like a raging lion,

Pacing the earth, and tearing up his steps,

Fate in his eyes, and roaring with the pain

Of burning fury; think you saw his one hand

Fix'd on my throat, while the extended other

Grasp'd a keen threat'ning dagger: oh, 'twas thus

We last embrac'd, when, trembling with revenge,

Passion. He dragg'd me to the ground, and at my bosom
 Presented horrid death; cry'd out, My friends!
 Where are my friends? swore, wept, rag'd, threaten'd,
 For he yet lov'd, and that dear love preserv'd me [lov'd;
 To this last trial of a father's pity.
 I fear not death, but cannot bear a thought
 That that dear hand should do th' unfriendly office.
 If I was ever then your care, now hear me;
 I fly to the senate, save the promis'd lives
 Of his dear friends, ere mine be made the sacrifice.

Venice Preserv'd, act 5.

To preserve the forefaid resemblance between words and their meaning, the sentiments of active and hurrying passions ought to be dressed in words where syllables prevail that are pronounced short or fast; for these make an impression of hurry and precipitation. Emotions, on the other hand, that rest upon their object, are best expressed by words where syllables prevail that are pronounced long or slow. A person affected with melancholy, has a languid and slow train of perceptions. The expression best suited to that state of mind, is where words, not only of long, but of many syllables, abound in the composition; and for that reason, nothing can be finer than the following passage:

In those deep solitudes, and awful cells,
 Where heav'nly-pensive Contemplation dwells,
 And ever-musing Melancholy reigns.

POPE, Ælisa to Abeland.

To preserve the same resemblance, another circumstance is requisite, that the language, like the emotion, be rough or smooth, broken or uniform. Calm and sweet emotions are best expressed by words that glide softly: surprise, fear, and other turbulent passions, require an expression both rough and broken.

It cannot have escaped any diligent inquirer into nature, that, in the hurry of passion, one generally expresses that thing first which is most at heart; which is beautifully done in the following passage:

Me, me; adsum qui feci: in me convertite ferrum,
 O Rutuli, mea fraus omnis.

Æneid. ix. 427.

Passion has often the effect of redoubling words, the better to make them express the strong conception of the mind. This is finely imitated in the following examples.

————— Thou sun, said I, fair light!
 And thou enlighten'd earth, so fresh and gay!
 Ye hills and dales, ye rivers, woods, and plains!
 And ye that live, and move, fair creatures! tell,
 Tell, if ye saw, how came I thus, how here.—

Paradise Lost, b. viii. 273.

————— Both have sinn'd! but thou
 Against God only; I, 'gainst God and thee:
 And to the place of judgment will return;
 There with my cries importune Heav'n, that all
 The sentence, from thy head remov'd, may light
 On me, sole cause to thee of all this wo;
 Me! me! only just object of his ire.

Paradise Lost, b. x. 930.

In general, the language of violent passion ought to be broken and interrupted. Soliloquies ought to be

so in a peculiar manner: language is intended by nature for society; and a man when alone, though he always clothes his thoughts in words, seldom gives his words utterance, unless when prompted by some strong emotion; and even then by starts and intervals only. Shakespeare's soliloquies may be justly established as a model; for it is not easy to conceive any model more perfect. Of his many incomparable soliloquies, the two following only shall be quoted, being different in their manner.

Hamlet. Oh, that this too, too solid flesh, would
 Thaw, and resolve itself into a dew! [melt,

Or that the Everlasting had not fix'd
 His canon 'gainst self-slaughter! O God! O God!
 How weary, stale, flat, and unprofitable,
 Seem to me all the uses of this world!
 Fie on't! O fie! 'tis an unweeded garden,
 That grows to seed: things rank and gross in nature
 Possess it merely.—That it should come to this!
 But two months dead! nay, not so much; not two—
 So excellent a king, that was, to this,
 Hyperion to a satyr: so loving to my mother,
 That he permitted not the winds of heav'n
 Visit her face too roughly. Heav'n and earth!
 Must I remember—why, the would hang on him,
 As if increase of appetite had grown
 By what it fed on: yet, within a month—
 Let me not think—Fratrity, thy name is *Woman!*
 A little month! or ere these shoes were old,
 With which she follow'd my poor father's body,
 Like Niobe, all tears—why she, ev'n she—
 (O heav'n! a beast, that wants discourse of reason,
 Would have mourn'd longer—) married with mine
 uncle,

My father's brother; but no more like my father
 Than I to Hercules. Within a month!—
 Ere yet the salt of most unrighteous tears
 Had left the flushing in her galled eyes,
 She married—Oh, most wicked speed, to post
 With such dexterity to incestuous sheets!
 It is not, nor it cannot come to good.
 But break, my heart, for I must hold my tongue.

Hamlet, act 1. sc. 3.

“*Ford.* Hum! ha! is this a vision? is this a dream?
 “do I sleep? Mr Ford, awake; awake, Mr Ford;
 “there's a hole made in your best coat, Mr Ford!
 “this 'tis to be married! this 'tis to have linen and
 “buck baskets? Well, I will proclaim myself what
 “I am; I will now take the leacher; he is at my
 “house; he cannot 'scape me; 'tis impossible he
 “should; he cannot creep into a halfpenny purse,
 “nor into a pepper-box. But lest the devil that
 “guides him should aid him, I will search impossible
 “places; tho' what I am I cannot avoid, yet to be
 “what I would not, shall not make me tame.”

Merry Wives of Windsor, act 3. sc. last.

These soliloquies are accurate and bold copies of nature: in a passionate soliloquy one begins with thinking aloud, and the strongest feelings only are expressed; as the speaker warms, he begins to imagine one listening, and gradually slides into a connected discourse.

How far distant are soliloquies generally from these models? So far indeed as to give disgust instead of pleasure.

Passion.

pleasure. The first scene of *Iphigenia in Tauris* discovers that princess, in a soliloquy, gravely reporting to herself her own history. There is the same impropriety in the first scene of *Alceste*, and in the other introductions of Euripides, almost without exception. Nothing can be more ridiculous; it puts one in mind of a most curious device in Gothic paintings, that of making every figure explain itself by a written label issuing from its mouth. The description which a parasite, in the Eunuch of Terence (*act* 2. *sc.* 2.) gives of himself, makes a sprightly soliloquy: but it is not consistent with the rules of propriety; for no man, in his ordinary state of mind and upon a familiar subject, ever thinks of talking aloud to himself. The same objection lies against a soliloquy in the *Adelphi* of the same author (*act* 1. *sc.* 1.) The soliloquy which makes the third scene *act* third of his *Heicyra*, is insufferable; for there Pamphilus, solely and circumstantially, relates to himself an adventure which had happened to him a moment before.

Cornelle is unhappy in his soliloquies: Take for a specimen the first scene of *Cinna*.

Racine is extremely faulty in the same respect. His soliloquies are regular harangues, a chain completed in every link, without interruption or interval: that of Antiochus in *Berenice* (*act* 1. *sc.* 2) resembles a regular pleading, where the parties *pro* and *con* display their arguments at full length. The following soliloquies are equally faulty: *Bajazet*, *act* 3. *sc.* 7.; *Mithridate*, *act* 3. *sc.* 4.; and *act* 4. *sc.* 5.; *Iphigenia*, *act* 4. *sc.* 8.

Soliloquies upon lively or interesting subjects, but without any turbulence of passion, may be carried on in a continued chain of thought. It, for example, the nature and sprightliness of the subject prompt a man to speak his thoughts in the form of a dialogue, the expression must be carried on without break or interruption, as in a dialogue between two persons; which justifies Falstaff's soliloquy upon honour:

"What need I be so forward with Death, that calls not on me? Well, 'tis no matter, Honour pricks me on. But how if Honour prick me off, when I come on? how then? Can honour set a leg? No. Or an arm? No. Or take away the grief of a wound? No. Honour hath no skill in surgery then? No. What is Honour? A word.—What is that word honour? Air; a trim reckoning.—Who hath it? He that dy'd a Wednesday. Doth he feel it? No. Doth he hear it? No. Is it insensible then? Yea, to the dead. But will it not live with the living? No. Why? Detraction will not suffer it. Therefore I'll none of it; honour is a mere scutcheon: and so ends my catechism."

First Part, Henry IV. act 5. *sc.* 2.

And even without dialogue a continued discourse may be justified, where a man reasons in a soliloquy upon an important subject; for if in such a case it be at all excusable to think aloud, it is necessary that the reasoning be carried on in a chain; which justifies that admirable soliloquy in *Hamlet* upon life and immortality, being a serene meditation upon the most interesting of all subjects. And the same consideration will justify the soliloquy that introduces the 5th *act* of Addison's *Cato*.

Language ought not to be elevated above the tone of the sentiment. Passion.

Zara. Swift as occasion, I
Myself will fly; and earlier than the morn
Wake thee to freedom. Now 'tis late; and yet
Some news few minutes past arriv'd, which seem'd
To shake the temper of the king—Who knows
What racking cares disease a monarch's bed?
Or love, that late at night still lights his lamp,
And strikes his rays through dusk, and folded lids,
Forbidding rest, may stretch his eyes awake,
And force their balls abroad at this dead hour.
I'll try.

Mourning Bride, act 3. *sc.* 4.

The language here is undoubtedly too pompous and laboured for describing so simple a circumstance as absence of sleep. In the following passage, the tone of the language, warm and plaintive, is well suited to the passion, which is recent grief: but every one will be sensible, that in the last couplet save one the tone is changed, and the mind suddenly elevated to be let fall as suddenly in the last couplet:

Il déteste à jamais sa coupable victoire,
Il renonce à la cour, aux humains, à la gloire;
Et se fuit lui-même, au milieu des deserts,
Il va cacher sa peine au bout de l'univers;
Là, soit que le soleil rendît le jour au monde,
Soit qu'il finît sa course au vaste sein de l'onde,
Sa voix faisoit redire aux echos attendris,
Le nom, le triste nom, de son malheureux fils.

Henriade, chant viii. 229.

Light and airy language is unsuitable to a severe passion.

Imagery and figurative expression are discordant, in the highest degree, with the agony of a mother, who is deprived of two hopeful sons by a brutal murder. Therefore the following passage is undoubtedly in a bad taste:

Queen. Ah, my poor princes! ah, my tender babes!
My unblown flowers, new appearing sweets!
If yet your gentle souls fly in the air,
And be not fixt in doom perpetual,
Hover about me with your airy wings,
And hear your mother's lamentation.

Richard III. act 4. *sc.* 4.

Again:

K. Philip. You are as fond of grief as of your child.
Constance. Grief fills the room up of my absent child,
Lies in his bed, walks up and down with me,
Puts on his pretty looks, repeats his words,
Remembers me of all his gracious parts,
Stuffs out his vacant garment with his form;
Then have I reason to be fond of grief.

King John, act 3. *sc.* 9.

Thoughts that turn upon the expression instead of the subject, commonly called a *play of words*, being low and childish, are unworthy of any composition, whether gay or serious, that pretends to any degree of elevation.

In the *Amynta* of Tasso, the lover falls into a mere play of words, demanding how he who had lost himself, could find a mistress. And for the same reason, the

Passion. the following passage in Corneille has been generally condemned : **Passions.**

Clémence. Mon pere est mort, Elvire, et la pre-
nante épée

Dont s'est armée Rodrigue a sa trame coupée.
Pleurez, pleurez, mes yeux, et fondez vous en eaux,
La moitié de ma vie a mis l'autre au tombeau,
Et m'a ligé a venger, apres ce coup funeste,
Celle que je n'ai plus, sur celle que me reste.

Cid, act 3. sc. 3.

To die is to be banish'd from myself :
And Sylvia is myself : banish'd from her,
Is felt from felt ; a deadly banishment !

Two Gentlemen of Verona, act 3. sc. 3.

Countess. I pray thee, Lady, have a better cheer :
If thou engross'st all the griefs as thine,
Thou robb'st me of a moiety

All's well that ends well, act 3. sc. 3.

K. Henry. O my poor kingdom, sick with civil
blows !

When that my care could not with-hold thy riots,
What wilt thou do when riot is thy care ?
O, thou wilt be a wilderness again,
Peopled with wolves, thy old inhabitants.

Second Part, Henry IV. act 4. sc. 11.

Cruda Amarilli. che col nome ancora
D'amar, ah! lasso, amaramente insegna.

Pastor Fido, act 1. sc. 2.

Antony, speaking of Julius Cæsar :

O world ! thou wast the forest of this hart ;
And this, indeed, O world, the heart of thee.
How like a deer, stricken by many princes,
Dost thou here lie !

Julius Cæsar, act 3. sc. 3.

Playing thus with the sound of words, which is still
worse than a pun, is the meanest of all conceits. But
Shakespeare, when he descends to a play of words,
is not always in the wrong ; for it is done sometimes
to denote a peculiar character, as in the following
passage :

K. Philip. What say'st thou, boy ? look in the
lady's face.

Lewis. I do, my Lord, and in her eye I find
A wonder, or a wond'rous miracle ;
The shadow of myself form'd in her eye ;
Which being but the shadow of your son,
Becomes a son, and makes your son a shadow.
I do protest, I never lov'd myself
Till now infixed I beheld myself
Drawn in the flatt'ring table of her eye.

Faulconbridge. Drawn in the flatt'ring table of
her eye !

Hang'd in the frowning wrinkle of her brow !
And quarter'd in her heart ! he doth espy
Himself Love's traitor : this is pity now,
That hang'd, and drawn, and quarter'd there should be
In such a love so vile a lout as he.

King John, act 2. sc. 5.

A jingle of words is the lowest species of that low
wit, which is scarce sufferable in any case, and least of

all in an heroic poem : and yet Milton in some instan-
ces has descended to that puerility :

And brought into the world a world of wo.

— Begirt th' Almighty throne

Beseeching or besieging —

Which tempted our attempt —

At one slight bound high overleap'd all bound.

— — — — — With a shout

Loud as from numbers without number.

One should think it unnecessary to enter a caveat
against an expression that has no meaning, or no distinct
meaning ; and yet somewhat of that kind may be found
even among good writers.

Sebastian. I beg no pity for this mould'ring clay.

For if you give it burial, there it takes

Possession of your earth :

If burnt and scatter'd in the air ; the winds

That strow my dust, diffuse my royalty,

And spread me o'er your clime ; for where one atom
Of mine shall light, know there Sebastian reigns.

DRYDEN, *Don Sebastian King of Portugal*, act 1.

Cleopatra. Now, what news, my Charmion ?

Will he be kind ? and will he not forsake me ?

Am I to live or die ? nay, do I live ?

Or am I dead ? for when he gave his answer,

Fate took the word, and then I liv'd or dy'd.

DRYDEN, *All for Love*, act 2.

If she be coy, and scorn my noble fire,

If her chill heart I cannot move ;

Why, I'll enjoy the very love,

And make a mistress of my own desire.

COWLEY, poem inscribed "The Request."

His whole poem inscribed *My Picture* is a jargon of
the same kind.

— — — — — 'Tis he, they cry, by whom

Not men, but war itself is overcome.

Indian Queen.

Such empty expressions are finely ridiculed in the
Rehearsal.

Was't not unjust to ravish hence her breath,
And in life's stead to leave us nought but death ?

Act 4. sc. 1.

PASSIONS, in medicine, make one of the non-
naturals, and produce very sensible effects. Joy, anger,
and fear, are the principal. In the two first, the spirits
are hurried with too great vivacity ; whereas, in fear
or dread, they are as it were curbed and concentrated :
whence we may conclude, that they have a very bad
effect upon health ; and therefore it will be best to
keep them within bounds as much as possible, and
to preserve an inward serenity, calmness, and tran-
quillity.

PASSIONS, in painting, are the external expressions
of the different dispositions and affections of the mind ;
but particularly their different effects upon the several
features of the face : for though the arms, and indeed
every part of the body*, serve likewise, by their quick,
languid, and variously diversified motions, to express
the passions of the soul ; yet, in painting, this difference
* See *Ore-*
tory, n° 205

Passions. is most conspicuous in the face. See **PAINTING**, p. 620. and **DRAWING**, § 8.

As we have given engravings of Le Brun's drawings of the passions, we shall here subjoin the account which he has given of each of these heads. See Plates CCCLXXVIII and CCCLXXIX.

1. The effects of *attention* are, to make the eye-brows sink and approach the sides of the nose; to turn the eye-balls toward the object that causes it; to open the mouth, and especially the upper part; to decline the head a little, and fix it without any other remarkable alteration.

2. *Admiration* causes but little agitation in the mind, and therefore alters but very little the parts of the face; nevertheless the eye-brow rises; the eye opens a little more than ordinary; the eye-ball placed equally between the eye-lids appears fixed on the object; the mouth half opens, and makes no sensible alteration in the cheeks.

3. The motions that accompany *admiration with astonishment* are hardly different from those of simple admiration, only they are more lively and stronger marked; the eye-brows more elevated; the eyes more open; the eye-ball further from the lower eye-lid, and more steadily fixed: The mouth is more open, and all the parts in a much stronger emotion.

4. Admiration begets esteem, and this produces *veneration*, which, when it has for its object something divine or beyond our comprehension, makes the face decline, and the eye-brows bend down; the eyes are almost shut and fixed: the mouth is shut. These motions are gentle, and produce but little alterations in the other parts.

5. Although *rapture* has the same object as veneration, only considered in a different manner, its motions are not the same; the head inclines to the left side; the eye-balls and eye-brows rise directly up; the mouth half opens, and the two corners are also a little turned up: the other parts remain in their natural state.

6. The passion of *desire* brings the eye-brows close together and forwards toward the eyes, which are more open than ordinary; the eye-ball is inflamed, and places itself in the middle of the eye; the nostrils rise up, and are contracted towards the eyes; the mouth half opens, and the spirits being in motion give a lively glowing colour.

7. Very little alteration is remarked in the face of those that feel within themselves the *sweetness of joy*, or *joy with tranquillity*. The forehead is serene; the eye-brow without motion, elevated in the middle; the eye pretty open and with a laughing air; the eye-ball lively and shining; the corners of the mouth turn up a little; the complexion is lively; the cheeks and lips are red.

8. *Laughter*, which is produced by joy mixed with surprise, makes the eye-brows rise towards the middle of the eye, and bend towards the sides of the nose; the eyes are almost shut, and sometimes appear wet, or shed tears, which make no alteration in the face; the mouth half open, shows the teeth; the corners of the mouth drawn back, cause a wrinkle in the cheeks, which appear so swelled as to hide the eyes in some

measure; the nostrils are open, and all the face is of a red colour. **Passions.**

9. *Acute pain* makes the eye-brows approach one another, and rise towards the middle; the eye-ball is hid under the eye-brows; the nostrils rise and make a wrinkle in the cheeks; the mouth half opens and draws back: all the parts of the face are agitated in proportion to the violence of the pain.

10. *Simple bodily pain* produces proportionally the same motions as the last, but not so strong: The eye-brows do not approach and rise so much; the eye-ball appears fixed on some object; the nostrils rise, but the wrinkles in the cheeks are less perceivable; the lips are further asunder towards the middle, and the mouth is half open.

11. The dejection that is produced by *sadness* makes the eye-brows rise towards the middle of the forehead more than towards the cheeks; the eye-ball appears full of perturbation; the white of the eye is yellow; the eye-lids are drawn down, and a little swelled; all about the eyes is livid; the nostrils are drawn downward; the mouth is half open, and the corners are drawn down; the head carelessly leaning on one of the shoulders: the face is of a lead colour; the lips pale.

12. The alterations that *weeping* occasions are strongly marked: The eye-brows sink down towards the middle of the forehead; the eyes are almost closed, wet, and drawn down towards the cheeks; the nostrils swelled; the muscles and veins of the forehead appear; the mouth is shut, and the sides of it are drawn down, making wrinkles on the cheeks; the under lip pushed out, presses the upper one: all the face is wrinkled and contracted; its colour is red, especially about the eye-brows, the eyes, the nose, and the cheeks.

13. The lively attention to the misfortunes of another, which is called *compassion*, causes the eye-brows, to sink towards the middle of the forehead; the eye-ball to be fixed upon the object; the sides of the nostrils next the nose to be a little elevated, making wrinkles in the cheeks; the mouth to be open; the upper lip to be lifted up and thrust forwards; the muscles and all the parts of the face sinking down and turning towards the object which excites the passion.

14. The motions of *scorn* are lively and strong: The forehead is wrinkled; the eye-brow is knit; the side of it next the nose sinks down, and the other side rises very much; the eye is very open, and the eye-ball is in the middle; the nostrils rise, and draw towards the eyes, and make wrinkles in the cheeks; the mouth shuts, its sides sinking down, and the under-lip is pushed out beyond the upper one.

15. An object despised sometimes causes *horror*, and then the eye-brow knits, and sinks a great deal more. The eye-ball, placed at the bottom of the eye, is half covered by the lower eye-lid; the mouth is half open, but closer in the middle than the sides, which being drawn back, makes wrinkles in the cheeks; the face grows pale, and the eyes become livid; the muscles and the veins are marked.

16. The violence of *terror or fright* alters all the parts of the face; the eye-brow rises in the middle,

Passions

Passive.

its muscles are marked, swelled, pressed one against the other, and sunk towards the nose, which draws up as well as the nostrils; the eyes are very open; the upper eyelid is hid under the eye-brow; the white of the eye is encompassed with red; the eye-ball fixes toward the lower part of the eye; the lower part of the eye-lid swells and becomes livid; the muscles of the nose and cheeks swell, and these last terminate in a point toward the sides of the nostrils; the mouth is very open, and its corners very apparent; the muscles and veins of the neck stretched; the hair stands on end; the colour of the face, that is, the end of the nose, the lips, and round the eyes, is pale and livid; and all ought to be strongly marked.

17. The effects of *anger* show its nature. The eyes become red and inflamed; the eye-ball is staring and sparkling; the eye-brows are sometimes elevated and sometimes sunk down equally; the forehead is very much wrinkled, with wrinkles between the eyes; the nostrils are open and enlarged; the lips pressing against one another, the under one rising over the upper one leaves the corners of the mouth a little open, making a cruel and disdainful grin.

18. *Hatred or jealousy* wrinkles the forehead; the eye-brows are sunk down and knit; the eye-ball is half hid under the eye-brows, which turn towards the object; it should appear full of fire, as well as the white of the eye and the eye-lid; the nostrils are pale, open, more marked than ordinary, and drawn backward so as to make wrinkles in the cheeks; the mouth is so shut as to show the teeth are closed; the corners of the mouth are drawn back and very much sunk; the muscles of the jaw appear sunk; the colour of the face is partly inflamed and partly yellowish; the lips pale or livid.

19. As *despair* is extreme, its motions are so likewise; the forehead wrinkles from the top to the bottom; the eye-brows bend down over the eyes, and press one another on the sides of the nose; the eye seems to be on fire, and full of blood; the eye-ball is disturbed, hid under the eye-brow, sparkling and unfixed; the eye-lid is swelled and livid; the nostrils are large, open, and lifted up; the end of the nose sinks down; the muscles, tendons, and veins are swelled and stretched; the upper part of the cheeks is large, marked, and narrow towards the jaw; the mouth drawn backwards is more open at the sides than in the middle; the lower lip is large and turned out; they gnash their teeth; they foam; they bite their lips, which are pale; as is the rest of the face; the hair is strait and stands on end.

PASSION-Flower. See *PASSIFLORA*.

PASSION-Week, the week immediately preceding the festival of Easter; so called, because in that week our Saviour's passion and death happened. The Thursday of this week is called *Maunday Thursday*; the Friday, *Good-Friday*; and the Saturday, the *Great Sabbath*.

PASSIVE, in general, denotes something that suffers the action of another, called an *agent* or *active power*. In grammar, the verb or word that expresses this passion is termed a *passive verb*: which, in the learned languages, has a peculiar termination; as *amor, doceor*, &c. in Latin; that is an *r* is added to the actives *amo, doceo*: and, in the Greek, the inflection is made by changing *o* into *etai*; as *τιμιτις* *τιμιτις*.

Passive. But, in the modern languages, the passive inflection is performed by means of auxiliary verbs, joined to the participle of the past tense; as, "I am praised," in Latin *lauder*, and in Greek *τιμιτις*; or, "I am loved," in Latin *amor*, and in Greek *φιλιμμι*. Thus it appears, that the auxiliary verb *am*, serves to form the passives of English verbs: and the same holds of the French; as, *Je suis loué*, "I am praised;" *J'ai été loué*, "I have been praised," &c. See *GRAMMAR*.

PASSIVE Title, in Scots law. See *LAW*, Part II. No clxxx. 30.

PASSIVE Obedience, a political doctrine which has been much misrepresented, and is, of course, very obnoxious to the friends of freedom. Some nonjurors, in the end of the last and in the beginning of the passing century, imagining that monarchy is the only lawful form of government, and that hereditary monarchy is the only lawful species of that government, have coupled with passive obedience the ridiculous notion of a divine, hereditary, indefeasible right of certain families to govern with despotic sway all other families of the same nation. The absurdity of this notion needs not to be dwelt upon; but it may not be improper to observe, that it has nothing to do with passive obedience.

As taught by the ablest reasoners, who think that they are supported by holy scripture, passive obedience is as much a duty under republican as under monarchical governments; and it means no more, but that private individuals are bound by the most solemn moral ties not to resist the supreme power wheresoever placed in any nation. The supreme power can only be the legislature; and no man or body of men, who have not the power of enacting and abrogating laws can, on this principle, claim passive obedience from any subject. Whether the principle be well or ill founded, the absurdity which commonly attaches to the phrase *passive obedience*, originates from the mistaken loyalty of the adherents of the house of Stuart, who to aggravate the illegality of the revolution, were wont to represent James II. as supreme over both houses of parliament, and of course over all law. That such reveries were foolish, we need no other evidence than the statute-book, which shows, that in the office of legislation, the king, lords, and commons, are co-ordinate; and that when any one of these powers shall take upon itself to counteract the other two, the duty of passive obedience will oblige the subject to support the legislature. That resistance to the legislature, if lawful on any occasion, can be so only to oppose the most violent tyranny, has been shown by Mr Hume with great cogency of argument, and is indeed a proposition self-evident. That it can never be lawful on any occasion, Bishop Berkeley endeavoured to prove by a chain of reasoning which it would be difficult to break. We enter not into the controversy, but refer our readers to *Hume's Essays* and *Berkeley's Passive Obedience and Nonresistance*, or, as it was intitled by a late editor, *the Measure of Submission to civil Government*. We shall only observe, that there is a great difference between *active* and *passive* obedience; and that martyrs who consider themselves as bound on no account whatever to resist the supreme power, would yet suffer death rather than do an immoral action in obedience to any law of earthly origin.

Attention.



Veneration.



Admiration.



Admiration with Astonishment.



Joy with Tranquillity.



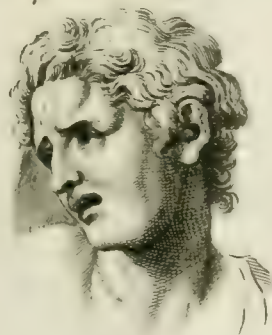
Rapture.



Desire.



Simple Bodily Pain.



Laughter.



Acute Pain.



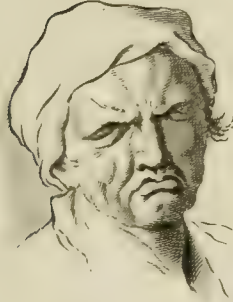
Acute Pain the opposite.

PASSIONS.

Plate CCCLXXIX
Compassion.

Indignity.

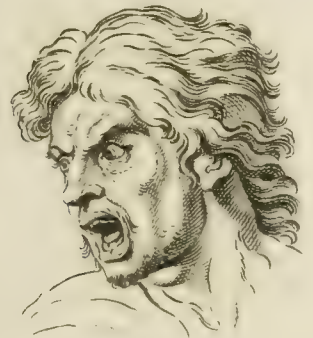
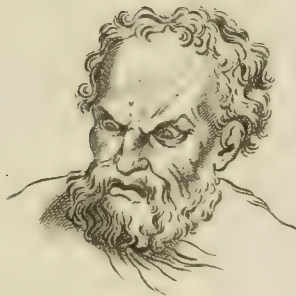
Weeping.



Scorn.

Horror.

Terror or Fright.



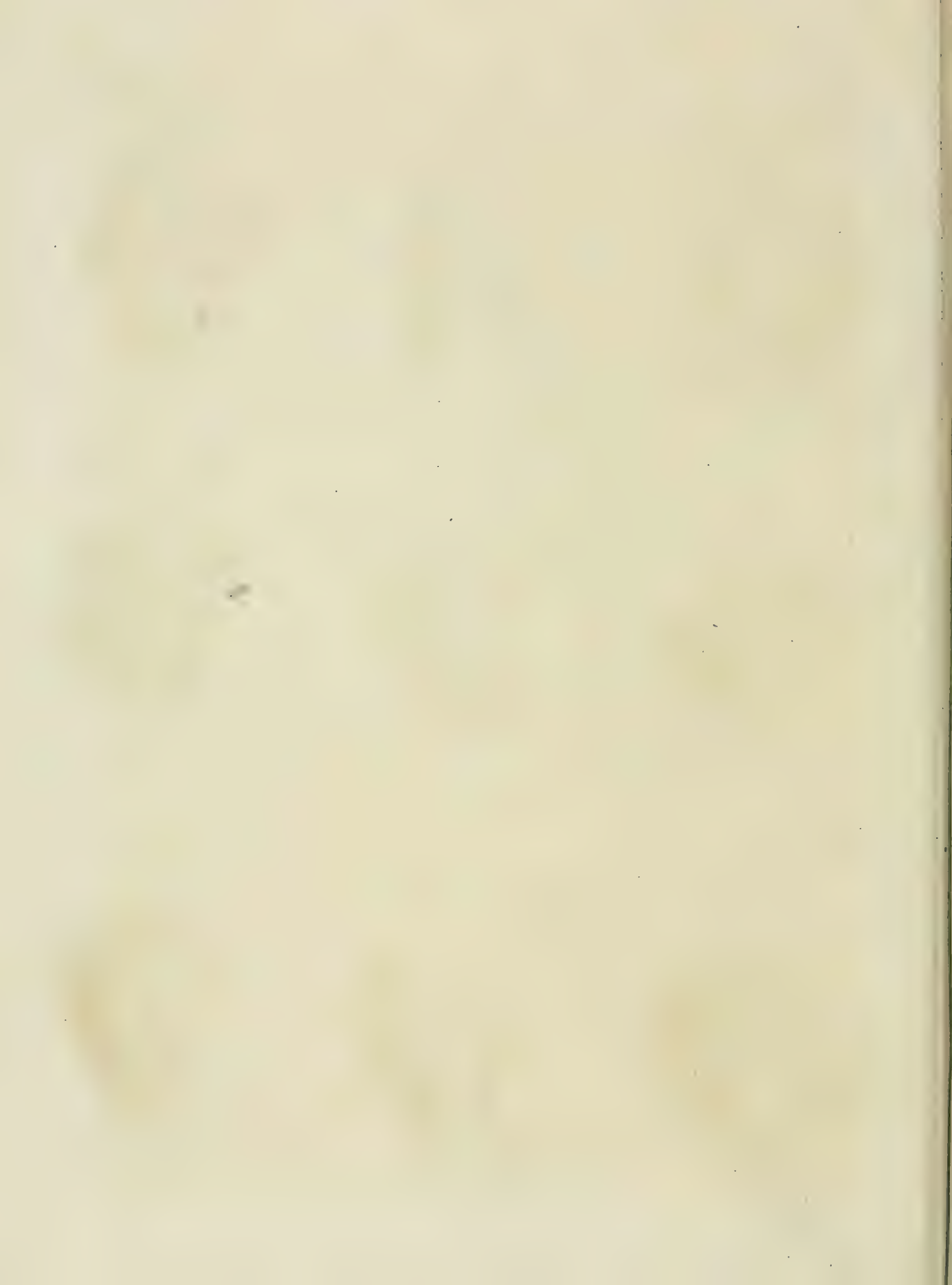
Anger.

Hatred or Jealousy.

Despair.



After the Death of the Sculptor.



Passive,
Paslover.

PASSIVE Prayer, among the *mythic* divines, is a total suspension or ligature of the intellectual faculties; in virtue whereof, the soul remains of itself, and as to its own power, impotent with regard to the producing of any effects. The passive state, according to Fenelon, is only passive in the same sense as contemplation is, *i. e.* it does not exclude peaceable, disinterested acts, but only unquiet ones, or such as tend to our own interest. In the passive state, the soul has not properly any activity, any sensation, of its own: it is a mere infinite flexibility of the soul, to which the feeblest impulse of grace gives motion.

PASSOVER, a solemn festival of the Jews, instituted in commemoration of their coming out of Egypt; because the night before their departure, the destroying angel, who put to death the first-born of the Egyptians, passed over the houses of the Hebrews without entering therein, because they were marked with the blood of the lamb which was killed the evening before, and which for this reason was called the *pascchal lamb*. This feast was called *pasccha* by the old Greeks and Romans; not we presume from *παρρη* "I suffer," as Chrysostom, Irenæus, and Tertullian, suppose, but from the Hebrew word *pasaph*, *passage*, *leap*. The following is what God ordained concerning the passover of the Jews, (Exod. xii.) The month of the coming forth from Egypt was looked upon from this time to be the first month of the sacred or ecclesiastical year, and the fourteenth day of this month, between the two vespers, that is, between the sun's decline and his setting: or rather, according to our manner of reckoning, between two o'clock in the afternoon and six o'clock in the evening at the equinox, they were to kill the pascchal lamb, and to abstain from leavened bread. The day following being the fifteenth, counting from six o'clock of the foregoing evening, which concluded the fourteenth, was the grand feast of the passover, which continued seven days. But it was only the first and the seventh day that were solemn. The lamb that was killed ought to be without any defect, a male, and yeaned that year. If no lamb could be found, they might take a kid. They killed a lamb or a kid in every family; and if the number of those that lived in the house was not sufficient to eat a lamb, they might join two houses together. With the blood of the pascchal lamb they sprinkled the door-posts and lintel of every house, that the destroying angel, at the sight of the blood, might pass over them, and save the Hebrew children. They were to eat the lamb the same night that followed the sacrifice; they eat it roasted, with unleavened bread, and a salad of wild lettuce. The Hebrew says literally, with bitter things, as suppose mustard, or any thing of this nature to give a relish. It was forbid to eat any part of it raw, or boiled in water, nor were they to break a bone, (Exod. xii. 46. Numb. ix. 12. John xix. 36.); and if any thing remained to the day following, it was thrown into the fire. They that eat it were to be in the posture of travellers, having their reins girt, their shoes on their feet, their staves in their hands, and eating in a hurry. But this last part of the ceremony was but little observed, at least it was of no obligation, but only upon that night they came forth out of Egypt. For the whole eight days of the passover no leavened bread

was to be used; and whoever should eat any, was threatened to be cut off from his people. With regard to the ceremonies which are observed in relation to the bread, see the article **BREAD**, p. 531. col. 2.

They kept the first and last day of the feast, yet so as that it was allowed to dress victuals, which was forbidden on the Sabbath-day. The obligation of keeping the passover was so strict, that whoever should neglect to do it, was condemned to death, (Numb. ix. 13.) But those who had any lawful impediment, as a journey, sickness, or any uncleanness, voluntary or involuntary; for example, those that had been present at a funeral, or by any other accident had been defiled, were to defer the celebration of the passover till the second month of the ecclesiastical year, or to the fourteenth day of the month Ijar, which answers to April and May. It was thus the Lord ordered Moses, upon the occasion of the inquiry of some Israelites, who had been obliged to pay their last offices to some of their relations, and who being thus polluted, were not capable of partaking of the pascchal sacrifice, (2 Chr. xxx. 1, 2, &c.) The modern Jews observe in general the same ceremonies that were practised by their ancestors, in the celebration of the passover. On the fourteenth of Nisan, the first-born fast in memory of God's smiting the first-born of the Egyptians. The morning prayers are the same with those said on other festivals. They take the roll of the pentateuch out of the chest, and read as far as the end of the twelfth chapter of Exodus, and what is contained in the eighteenth chapter of Numbers, relating to the passover. The matron of the family then spreads a table, and sets on it two unleavened cakes, and two pieces of the lamb, a shoulder boiled and another roasted, to put them in mind that God delivered them with a stretched out arm. To this they add some small fishes, because of the leviathan; a hard egg, because of the ziz; some meal, because of the behemoth, (these three animals being appointed for the feast of the elect in the other life); and peas and nuts for the children, to provoke their curiosity to ask the reason of this ceremony. They likewise use a kind of mustard, which has the appearance of mortar, to represent their making bricks in Egypt. The father of the family sits down with his children and slaves, because on this day all are free. Being set down, he takes bitter herbs, and dips them in the mustard, then eats them, and distributes to the rest. Then they eat of the lamb, the history and institution of which is at that time recited by the master of the family. The whole repast is attended with hymns and prayers. They pray for the prince under whose dominion they live, according to the advice of Jeremiah (xxix. 7.), "Seek the peace of the city whither I have caused you to be carried away captives, and pray unto the Lord for it: for in the peace thereof shall ye have peace." See the article **FEAST**, &c. The same things are put in practice the two following days; and the festival is concluded by the ceremony *hal dala* or distinction. This ceremony is performed at the closing of the Sabbath-day, at which time the master of the house pronounces certain benedictions, accompanied with certain formalities, requesting that every thing may succeed well the week following. After going out of the synagogue, they then eat leavened bread for the last time. (Leo of

Passover.

Passover,
Passport.

Modena, p. iii. c. 3. and the Rablins.) While the temple was standing, they brought their lambs thither, and sacrificed them, offering the blood to the priest, who poured it out at the foot of the altar. The passover was typically predictive of Christ our christian passover, (1 Cor. v. 7.) As the destroying angel passed over the houses marked with the blood of the paschal lamb, so the wrath of God passes over them whose souls are sprinkled with the blood of Christ. The paschal lamb was killed before Israel was delivered, so it is necessary Christ should suffer before we could be redeemed. It was killed before Moses's law or Aaron's sacrifices were enjoined, to show that deliverance comes to mankind by none of them; but only the true passover, that Lamb of God slain from the foundation of the world, (Rom. iii. 25. Heb. ix. 14.) It was killed the first month of the year, which prefigured that Christ should suffer death in this month, (John xviii. 28.) It was killed in the evening, (Exod. xii. 6.) So Christ suffered in the last days, and at this time of the day, (Matt. xxvii. 46. Heb. i. 2.) At even also the sun sets, which shows that it was the Son of Righteousness who was to suffer and die, and that at his passion universal darkness should be upon the whole earth, (Luke xxiii. 44.) The passover was roasted with fire, to denote the sharp and dreadful pains which Christ should suffer, not only from men, but from God also. It was to be eaten with bitter herbs, not only to put them in remembrance of their bitter bondage in Egypt, but also to typify our mortification to sin, and readiness to undergo afflictions for Christ, (Col. i. 24.) Many erroneously imagine, that the passover was instituted in memory of the Israelites passing the Red Sea; though it is certain the feast was held, and had its name, before the Israelites took a step of their way out of Egypt, and consequently several days before their passing the Red Sea. Besides the passover celebrated on the fourteenth of the first month, there was a second passover held on the fourteenth of the second month after the equinox, instituted by God in favour of travellers and sick persons, who could not attend at the first, nor be at Jerusalem on the day. The Greeks, and even some of the catholic doctors, from the thirteenth, eighteenth, and nineteenth, chapters, of St John, take occasion to conclude, that Jesus anticipated the day marked for the passover in the law; but the authority of three evangelists seems to evince the contrary. See Whitby's Dissertation on this subject, in an appendix to the fourteenth chapter of St Mark. F. Lamy supposes, that our Lord did not attend at the passover the last year of his life; which sentiment has drawn upon him abundance of opposers. F. Hardouin asserts, that the Galileans celebrated the passover on one day, and the Jews on another.

PASSPORT, or Pass, a licence or writing obtained from a prince or governor, granting permission and a safe conduct to pass through his territories without molestation: Also a permission granted by any state to navigate in some particular sea, without hindrance or molestation from it. It contains the name of the vessel, and that of the master, together with her tonnage and the number of her crew, certifying that she belongs to the subjects of a particular state, and requiring all persons at peace with that state to

suffer her to proceed on her voyage without interruption.

Passport
||
Paiste.

The violation of safe conducts or passports expressly granted by the king or by his ambassadors to the subjects of a foreign power in time of mutual war, or committing acts of hostility against such as are in amity, league, or truce with us, who are here under a general implied safe-conduct, are breaches of the public faith, without which there can be no intercourse or commerce between one nation and another; and such offences may, according to the writers upon the law of nations, be a proper ground of a national war. And it is enacted by the statute 31 Hen. VI. cap. 4. still in force, that if any of the king's subjects attempt or offend upon the sea, or in any port within the king's obedience, or against any stranger in amity, league, or truce, or under safe-conduct, and especially by attacking his person, or spoiling him, or robbing him of his goods; the lord-chancellor, with any of the justices of either the king's-bench or common-pleas, may cause full restitution and amends to be made to the party injured. Pasquier says, that *passport* was introduced for *passé-par-tout*. Balzac mentions a very honourable passport given by an emperor to a philosopher in these terms: "If there be any one on land or sea hardy enough to molest Potamon, let him consider whether he be strong enough to wage war with Cæsar."

PASSPORT is used likewise for a licence granted by a prince for the importing or exporting merchandizes, moveables, &c. without paying the duties. Merchants procure such passports for certain kinds of commodities; and they are always given to ambassadors and ministers for their baggage, equipage, &c.

PASSPORT is also a licence obtained for the importing or exporting of merchandizes deemed contraband, and declared such by tariffs, &c. as gold, silver, precious stones, ammunition of war, horses, corn, wool, &c. upon paying duties.

PASSUS, among the Romans, a measure of length, being about four feet ten inches, or the thousandth part of a Roman mile. The word properly signifies, the space betwixt the feet of a man walking at an ordinary rate. See MEASURE.

PASTE, in cookery, a soft composition of flour, wrought up with proper fluids, as water, milk, or the like, to serve for cakes or coffins, therein to bake meats, fruits, &c. It is the basis or foundation of pyes, tarts, patties, pasties, and other works of pastry. It is also used in confectionary, &c. for a preparation of some fruit, made by beating the pulp thereof with some fluid or other admixture, into a soft pappy consistence, spreading it into a dish, and drying it with sugar, till it becomes as pliable as an ordinary paste. It is used occasionally also for making the crusts and bottoms of pyes, &c. Thus, with proper admixtures, are made almond pastes, apple pastes, apricot pastes, cherry, currant, lemon, plum, peach, and pear pastes.

PASTE is likewise used for a preparation of wheaten flour, boiled up and incorporated with water; used by various artificers, as upholsterers, saddlers, bookbinders, &c. instead of glue or size, to fasten or cement their cloths, leathers, papers, &c. When paste is used by bookbinders, or for paper-hangings to rooms, they mix a fourth, fifth, or sixth, of the weight of the flour of powdered resin; and where it is wanted still more tenacious,

Pastes
||
Pastime.

nations, gum arabic or any kind of size may be added. Paste may be preserved, by dissolving a little sublimate, in the proportion of a dram to a quart, in the water employed for making it, which will prevent not only rats and mice, but any other kind of vermin and insects, from preying upon it.

PASTES, in the glass trade, or the imitation or counterfeiting of gems in glass, see GEM, p. 603.

PASTEBOARD, a kind of thick paper, formed of several single sheets pasted one upon another. The chief use of pasteboard is for binding books, making letter-cases, &c. See PAPER.

PASTERNEC of a HORSE, in the manege, is the distance betwixt the joint next the foot and the coronet of the hoof. This part should be short, especially in middle-sized horses; because long patterns are weak, and cannot so well endure travelling.

PASTERNEC-Joint, the joint next a horse's foot.

PASTIL, or PASTEL, among painters, a kind of paste made of different colours ground up with gum-water, in order to make CRAYONS.

PASTIL, in pharmacy, is a dry composition of sweet-smelling resins, aromatic woods, &c. sometimes burnt to clear and scent the air of a chamber.

PASTIME, a sport, amusement, or diversion. Pastimes of some kind seem to be absolutely necessary, and to none more than to the man of study; for the most vigorous mind cannot bear to be always bent. Constant application to one pursuit, if it deeply engage the attention, is apt to unhinge the mind, and to generate madness; of which the Don Quixote of Cervantes, and the astronomer of Johnson, are two admirably conceived instances. But though pastime is necessary to relieve the mind, it indicates great frivolity when made the business of life; and yet the rich and the great, who are not obliged to labour for the means of subsistence, too often rove from pastime to pastime with as constant assiduity as the mechanic toils for his family, or as the philosopher devotes himself to the cultivation of science. When those pastimes tend to give elasticity to the mind or strength to the body, such conduct is not only allowable, but praiseworthy; but when they produce effects the reverse of these, it is both hurtful and criminal. The gaming-table, the masquerade, the midnight assembly of any sort, must of necessity enfeeble both the body and the mind; and yet such are the fashionable amusements of the present day, to which many a belle and many a

beau sacrifice their beauty, their health, their quiet, Pastime. and their virtue.

Far different were the pastimes of our wiser ancestors: Remote from vice and effeminacy, they were innocent, manly, and generous exercises. From the ancient records of this country, it appears, that the sports, amusements, pleasures, and recreations, of our ancestors, as described by Fitz-Stephen (A), added strength and agility to the wheels of state-mechanism, while they had a direct tendency towards utility. For most of these ancient recreations are resolvable into the public defence of the state against the attacks of a foreign enemy. The play at ball, derived from the Romans, is first introduced by this author as the common exercise of every school-boy. The performance was in a field, where the resort of the most substantial and considerable citizens, to give encouragement and countenance to this feat of agility, was splendid and numerous. The intention of this amusement at this period of time was to make the juvenile race active, nimble, and vigorous; which qualities were requisite whenever their assistance should be wanted in the protection of their country. The next species of pastime indeed does not seem to have this tendency; but it was only, as it seems, an annual custom: This was cock-fighting. The author tells us, that in the afternoon of Shrove-Tuesday, on which day this custom prevailed, they concluded the day in throwing the ball: which seems to insinuate, that the cock-fighting was merely in conformity to ancient usage, and limited only to part of the day, to make way for a more laudable performance. We may reasonably suppose, although this author is entirely silent upon this head, that while cock-fighting was going on, cock-throwing was the sport of the lowest class of people, who could not afford the expence of the former (B). Another species of manly exercise was truly martial, and intended to qualify the adventurers for martial discipline. It is related by Fitz-Stephen thus: "Every Friday in Lent, a company of young men comes into the field on horseback, attended and conducted by the best horsemen: then march forth the sons of the citizens, and other young men, with disarmed lances and shields; and there practise feats of war. Many courtiers likewise, when the king is near the spot, and attendants upon noblemen, do repair to these exercises; and while the hope of victory does inflame their minds, they show by good proof how serviceable they would be in martial affairs."

C 2

This

(A) Otherwise called William Stephanides, a monk of Canterbury, who lived in the reign of King Stephen, to the time of Richard I. He wrote a Latin treatise, in which he gives an account of the several pastimes which were countenanced in his time. Bale in his writings draws a pleasing portrait of him. He is likewise sketched in strong and forcible outlines of praise and commendation by Leland. Bale says thus of him: "The time which other people usually misemployed in an idle and frivolous manner, he consecrated to inquiries which tended to increase the fame and dignity of his country: in doing which, he was not unworthy of being compared to Plato; for, like him, he made the study of men and heaven his constant exercise."

(B) There were places set apart for the battles of these animals, as at this day, where no one was admitted without money. These places, or *pits* commonly called, were schools, as at this day, in which people were instructed in the doctrines of chance, loss and gain, betting and wagers, and particularly in the liberal art of *laying two to one*. Cock-throwing has been laudably abolished; for it was a species of cruelty towards an innocent and useful animal; and such a cruelty as would have kindled compassion in the heart of the rankest barbarian.

Pastime.

This evidently is of Roman descent, and immediately brings to our recollection the *Ludus Troja*, supposed to be the invention, as it was the common exercise, of Ascanius. The common people, in this age of masculine manners, made every amusement where strength was exerted the subject-matter of instruction and improvement: instructed to exert their bodily strength in the maintenance of their country's rights; and their minds improved, by such exertion, into every manly and generous principle.

In the vacant intervals of industry and labour, commonly called the holy days, indolence and inactivity, which at this day mark this portion of time, were found only in those whose lives were disordered with age or infirmity. The view which Fitz-Stephen gives us of the Easter-holydays is animated. "In Easter-holydays they fight battles upon the water. A shield is hanged upon a pole, fixed in the middle of the stream. A boat is prepared without oars, to be borne along by the violence of the water; and in the fore-part thereof standeth a young man, ready to give charge upon the shield with his lance. If so be that he break his lance against the shield, and doth not fall, he is thought to have performed a worthy deed. If without breaking his lance he runs strongly against the shield, down he falleth into the water; for the boat is violently forced with the tide: but on each side of the shield ride two boats, furnished with young men, who recover him who falleth soon as they may. In the holydays all the summer the youths are exercised in leaping, dancing, shooting, wrestling, casting the stone, and practising their shields; and the maidens trip with their timbrels, and dance as long as they can well see. In winter, every holyday before dinner, the boars prepared for brawn are set to fight, or else bulls or bears are baited."

These were the laudable pursuits to which leisure was devoted by our forefathers, so far back as the year 1130. Their immediate successors breathed the same generous spirit. In the year 1222, the 6th year of Henry III. we find, that certain masters in exercises of this kind made a public profession of their instructions and discipline, which they imparted to those who were

desirous of attaining excellence and victory in these Pastime. honourable achievements. About this period, the persons of better rank and family introduced the play of *Tennis* (c); and erected courts or oblong edifices for the performance of the exercise.

About the year 1253, in the 38th year of Henry III. the *Quintan* was a sport much in fashion in almost every part of the kingdom. This contrivance consisted of an upright post firmly fixed in the ground, upon the top of which was a cross piece of wood, moveable upon a spindle; one end of which was broad like the flat part of an halberd, while at the other end was hung a bag of sand. The exercise was performed on horseback. The masterly performance was, when, upon the broad part being struck with a lance, which sometimes broke it, the assailant rode swiftly on, so as to avoid being struck on the back by the bag of sand, which turned round instantly upon the stroke given with a very swift motion. He who executed this feat in the most dexterous manner was declared victor, and the prize to which he became intitled was a peacock. But if, upon the aim taken, the contender miscarried in striking at the broadside, his impotency of skill became the ridicule and contempt of the spectators.

Dr Plott, in his *Natural History of Oxfordshire*, tells us, that this pastime was in practice in his time at Deddington in this county. "They first (says this author) fixed a post perpendicularly in the ground, and then placed a small piece of timber upon the top of it, fastened on a spindle, with a board nailed to it on one end, and a bag of sand hanging at the other. Against this board they anciently rode with spears: now as I saw it at Deddington only with strong staves, which violently bringing about the bag of sand, if they make not good speed away, it strikes them in the neck or shoulders, and sometimes perhaps strikes them down from their horses; the great design of the sport being to try the agility both of man and horse, and to break the board; which, whoever did, was accounted conqueror: for whom heretofore there was some reward always appointed." (D)

Matthew Paris, speaking of this manly diversion, says,

(c) The word *Tennis* seems to owe its original to the French language: if so, the game is of French production. Yet the word *tenez* will hardly be found to afford incontrovertible evidence upon this subject. For the holding or keeping possession of the ball is no part of the game, but rather a circumstance casually attending it: since, during the performance of it, the ball is in continual motion, so there can be no *tenez* at this juncture. Perhaps a place in France called *Tennis* (as there is a town which differs only in a letter, called *Sennois*, in the district of Champagne) was the place where the balls were first made, and the game first introduced.

(D) This was certainly an exercise derived from a military institution of the Romans, though not instrumentally the same. Whoever considers the form and disposition of the Roman camps, which were formed into a square figure, will find there were four principal gates or passages. Near the *Quæstorium*, or Quæstor's apartment, was the *Forum*, or what is now called a sutling-house, and from being near the Quæstor's station called *Quæstorium forum*. At this part was a fifth gate *Quintana*, where the soldiers were instructed in the discipline of the *Palatia*, which was to aim at and strike their javelins against an upright post fixed in the ground, as a kind of *prolusion* to a real engagement with an enemy. By the frequent practice of this exercise, sometimes called *exercitium ad palum* by Roman writers, the soldiers at length acquired not only a dexterity and address in the management of their arms, but a constant and regular exactness in the direction of them. *Titus Livius Patavinus*, cap. 2. *Pancirollus Rerum Memorial*. lib. ii. tit. 21. *Vulturius in Augustanis Monumentis*, lib. li. p. 237.

Upon the irruption of the *Istri* into the Roman camps, which they plundered, says Livius, *ad Quæstorium forum, quintanamque pervenerunt*.

astime. says, "The London youths made trial of their strength on horseback, by running at the *Quintan*; in doing which, whoever excelled all the rest was rewarded with a peacock." This sport is continued to this day in Wales; and being in use only upon marriages, it may be considered as a votive pastime, by which these heroic spirits seem to wish, that the male issue of such marriage may be as strong, vigorous, and active, as those who are at that time engaged in the celebration of this festive exertion of manhood. Virtuous exercises of this kind would be too rude and barbarous for the attendants on pleasure in the present age. The hand would tremble at the weight of the javelin; and the heart would pant upon the apprehension of personal insecurity. While these exertions of triumphant prowess continued, the sordid degeneracy of disposition, the supple baseness of temper, were unknown: for the love of country, as the Roman orator has wisely observed, *included all other virtues*. But if we guard the palace of honour, like the brazen castle of Danae, with every possible security, importunate corruption will be ever waiting at the gate, to seize an opportunity of intrusion. These feats of honourable contest were succeeded by the gilded banners of exhibition, and all the long train of dependents in the interest of indolence: for the writers of these times inform us, that the soft pleasures of the stage forced the passes to public favour in the year 1391, and likewise in the year 1409; so that utility, which before stood on the right hand of pleasure, was now ordered to withdraw for a season. The drama, it seems, was attempted by a set of useless and insignificant persons called *parish-clerks*; who, because they had the knowledge of the alphabet, ignorantly presumed that this included every other species of knowledge. The subject was truly serious, the creation of the world; but the performance must have been ludicrous. It was, however, honoured with the attendance of noble personages; and royalty itself deigned to cast a favourable eye upon it, for the king and queen were present. These interludes lasted no longer than the time requisite for the former confederacy of utility and pleasure to resume its powers; as when the pliable bow by being too much bent is put out of shape, and by its elasticity recovers its former position. The lance, the shield, the ball, and the equestrian procession, came forward again, and put the dramatic usurper to flight. After this period, these objects of generous pleasure seem to have had their audience of leave, and one general object, indeed no less manly than the former, to have filled their stations, which was archery. This had a continuance to the reign of Charles I. for we find in many hospitals founded in that reign, among the articles of benefaction recorded upon their walls, this singular provision, *arms for the boys*, which signified *bows and arrows*.

Pastime. There are many places at this day, formerly resorted to, for the practice of this noble art, distinguished by appellations which indicate their ancient usage: such as Brentford Butts, Newington Butts, and many others of the like denomination. It appears from 33 Hen. VIII. that by the intrusion of other pernicious games, archery had been for a long time disused; to revive which this statute was made. It seems that the bows of the best kind were made of yew; and that this wood might be readily obtained for this purpose, yew-trees were planted in churchyards. The sons of those only who were persons of fortune and fashion, if under 17 years of age, were permitted to use such bows. The words of the statute are singular, and ran thus: "No person under seventeen years, except he, or his father or mother, have lands or tenements to the yearly value of ten pounds, or be worth in value or moveables the sum of forty marks sterling, shall shoot with any bow of yew, which shall be bought for him, after the feast of our Lady next coming, under the pain to lose and forfeit six shillings and eightpence." Two observations arise here upon these words. One, that the yew-wood, not being so common as other wood, might probably be soon found deficient, as it was the best wood for making bows, if not restrained in the use of it to particular ages and persons, as young people wantonly destroy what is put into their hands for useful purposes. The other observation is, that the age of 17 is by this statute distinguished as the age of discretion, when young people are more attentive and considerate in things of private concern; an age in these times which few ever arrive at, and some never. This statute makes provision of other kinds of wood for the common people in the following manner: "To the intent that every person may have bows of mean price, be it enacted, that every bowyer shall, for every bow that he maketh of yew, make four other bows, meet to shoot with, of elm, wick, hazill, ash, or other wood apt for the same, under pain to lose and forfeit for every such bow so lacking the sum of three shillings and fourpence." It seems there was a species of yew at this time called *elk*, which wood was stronger and more pliant than the common yew mentioned in this statute, and the price of it fixed. "Moreover, no bowyer shall sell or put to sale to any of the king's subjects, any bow of yew of the tax called *elk*, above the price of three shillings and fourpence, under the pain to forfeit twenty shillings for every bow sold above the said price."

From these several considerations which occur in this statute, we can trace three resplendent qualities, courage, strength, and agility; which three united, inspired two more, generosity and magnanimity. Upon the decline of this and other polished (E) amusements, a savage deformity of manners sprung up, but spangled

(E) How widely different the conceptions of politeness at this day from what they were in the most refined ages of Greece and Rome! These two states agreed in fixing the standard of this accomplishment upon the fitness and propriety of things. We bend to an arbitrary imposture of language, trusting to the sense and meaning of our opposite Gallic neighbours, as if this island was at all times to be the foot-ball of that continent. To define politeness in its ancient and true sense, it is a manly exertion of conduct, founded upon every noble and virtuous principle. Gallic politeness is an effeminate impotence of demeanor, founded upon tallacy, evasion, and every insidious artifice. There can be no security, no happiness, no prosperity, awaiting this kingdom,

Pastime. spangled here and there with the opposite character of lazy opulence, which began now to erect her velvet standard in defiance of chaste and regular manners.

Towards the beginning of James I.'s reign, military prowess seems to have founded a retreat (F). He, to gratify the importunity of the common people, and at the same time to obviate his own fears upon a refusal, published a book of sports, in which the people had been some time before usually indulged on Sunday evenings, but which had been lately prohibited. These sports consisted of dancing, singing, wrestling, church ales, and other profanations of that day.

Charles, his successor wisely, in the very entrance of his reign, abolished these sports. The act of Charles states the several amusements in part; by which we may conjecture what was the remainder as stated in the book of sports by James. It is necessary to transcribe that part of the act relating to this subject. "Forasmuch as there is nothing more acceptable to God, than the true and sincere worship of Him, and service according to His holy will, and that the holy keeping of the Lord's day is a principal part of the service of God, which in many places of this realm hath been, and now is, profaned and neglected by a disorderly sort of people, in exercising and frequenting bear-baiting, bull-baiting, interludes, and common-plays, and other unlawful exercises and pastimes, neglecting divine service both in their own parishes and elsewhere: Be it enacted, that from and after forty days next after the end of this session of parliament, there shall be no meetings, assemblies, or concourse of people, out of their own parishes, on the Lord's day, within this realm of England, or any the dominions thereof, for any sports or pastimes whatsoever: nor any bear-baiting, bull-baiting, interludes, common plays, or other unlawful exercises or pastimes, used by any person or persons within their own parishes: and that every person and persons offending in any of the said premises, shall forfeit for every offence the sum of three shillings and fourpence; the same to be employed and converted to the use of the poor of the parish where such offence shall be committed." All this was perhaps proper, and showed the distinguished piety of this unfortunate monarch. But in this age likewise ended the manly sports of Britons, and nothing was introduced that could compensate for the loss.

All these lufury arts, considered as vehicles of pleasure, from the variety of their inventions, represent pleasure as a fleeting phantom: evincing at the same time the stability of happiness as springing from internal order. Even reflex acts, pregnant with future hopes of solace and social recreation, have more true feelings in expectancy than those which arise from the object in possession. Nay, pleasure is found frequently in the imagination only: for Ixion's disappointment frequently awaits us when we advance to embrace this Juno of our desires.

Pastime. Upon the whole, happiness, the only thing of intrinsic value, must arise in the heart, and be something more solid than what mere amusement can possibly supply. Amusements or pastimes ought to be considered only as necessary relaxations from severer and more useful employment; and in this point of view they may be solely pursued; but they become criminal when they occupy the place of the business of life.

PASTINACA, the **PARSNIP**: A genus of the digynia order, belonging to the pentandria class of plants; and in the natural method ranking under the 45th order, *Umbellatae*. The fruit is an elliptical compressed plane; the petals are involuted and entire. There are only two species of this genus; the principal of which is the *pastinaca sativa*, or garden-parsnep; which is an exceeding fine esculent root. It is to be propagated by sowing the seeds in February or March, in a rich mellow soil, which must be deep dug, that the roots may be able to run deep without hinderance.

It is a common practice to sow carrots at the same time, upon the same ground with the parsneps; and if the carrots are designed to be drawn young, there is no harm in it. The parsneps, when they are grown up a little, must be thinned to a foot distance, and carefully kept clear of weeds. They are finest tasted just at the season when the leaves are decayed: and such as are desirous to eat them in spring should have them taken up in autumn, and preserved in sand. When the seeds are to be sowed, some very strong and fine plants should be left four feet distance; and towards the end of August, or in the beginning of September, the seeds will be ripe: they must then be carefully gathered, and dried on a coarse cloth. They should always be sown the spring following; for they do not keep well.

Hints have been given and experiments made by agricultural societies, respecting parsneps, in order to raise them for winter food to cattle. It has long been a custom in some parts of Brittany, to sow parsneps in the open field for the food of cattle; as we are informed by the first volume of the Transactions of a Society instituted in that province, for the encouragement of the economical and commercial interests of their country. "It is of great importance (say they) that parsneps should be universally cultivated; because they afford an excellent and wholesome food for all kinds of cattle during the winter, and may be used to great advantage to fatten them. Our hogs have no other food in all that season, and our bullocks and oxen thrive well upon it. Our cows fed with parsneps give more milk than with any other winter fodder, and that milk yields better butter than the milk of cows nourished with any other substance. Our horses fatten with this food; though some pretend that it renders them less mettlesome, and hurts their legs and eyes. Cattle eat these roots raw at first sliced lengthwise;

kingdom, so long as we fawn to fashions that disgrace humanity, and to manners which consist of more than Punic perfidy.

(F) It hath been confidently asserted by some historians, that James was, during his whole life, struck with terror upon the sight of a drawn sword; which was the reason of his great unwillingness in bestowing the honour of knighthood. For at this juncture, he had such a tremor upon him, that instead of laying the sword upon the shoulder of the person to be knighted, he frequently would be observed almost to thrust the point of it into the face of the party: which occasioned those about him to assist him in the direction of his hand.

pastophori lengthwise; and when they begin not to relish them, they are cut in pieces, put into a large copper, pressed down there, and boiled with only so much water as fills up the chafins between them. They then eat them very greedily, and continue to like them." See *PANAX* and *OPOPANAX*.

PASTOPHORI, amongst the ancients, were priests whose office it was to carry the images, along with the shrines of the gods, at solemn festivals, when they were to pray to them for rain, fair weather, or the like. The Greeks had a college of this order of priests in Sylla's time. The cells or apartments near the temples, where the *pastophori* lived, were called *pastophoria*. There were several lodging-rooms for the priests of a similar kind in the temple of Jerusalem.

PASTORAL, in general, something that relates to shepherds: hence we say, pastoral life, manners, poetry, &c.

Pastoral life may be considered in three different views; either such as it now actually is; when the state of shepherds is reduced to be a mean, servile, and laborious state; when their employments are become disagreeable, and their ideas gross and low: or such as we may suppose it once to have been, in the more early and simple ages, when it was a life of ease and abundance; when the wealth of men consisted chiefly in flocks and herds, and the shepherd, though unrefined in his manners, was respectable in his state: or, lastly, such as it never was, and never can in reality be, when, to the ease, innocence, and simplicity of the early ages, we attempt to add the polished taste, and cultivated manners, of modern times. Of these three states, the first is too gross and mean, the last too refined and unnatural, to be made the ground-work of pastoral poetry. Either of these extremes is a rock upon which the poet will split, if he approach too near it. We shall be disgusted if he give us too much of the servile employments and low ideas of actual peasants, as Theocritus is censured for having sometimes done; and if, like some of the French and Italian writers of pastorals, he makes his shepherds discourse as if they were courtiers and scholars, he then retains the name only, but wants the spirit of pastoral poetry.

PASTORAL Poetry. See *POETRY*, Part II. Sect. IV.

PASTRY, that branch of cookery which is chiefly taken up in making pies, pasties, cakes, &c. See *PASTE*.

Dr Cullen observes, that paste is very hard and indigestible without butter; and even with it, is apt to produce heart-burn and accefcency. Perhaps this is increased by the burned butter, from a certain sensibility in the stomach, which occasions all empyreumatic oils to be long retained, and so turn rancefcient and acid.

PASTURE, or *PASTURE-Land*, is that reserved for feeding cattle.

Pasture land is of such advantage to husbandry, that many prefer it even to corn-land, because of the small hazard and labour that attends it; and as it lays the foundation for most of the profit that is expected from the arable land, because of the manure afforded by the cattle which are fed upon it. Pasture ground is of two sorts; the one is meadow land, which is often overflowed; and the other is upland, which lies high

and dry. The first of these will produce a much greater quantity of hay than the latter, and will not require manuring or dressing so often: but then the hay produced on the upland is much preferable to the other; as is also the meat which is fed in the upland more valued than that which is fatted in rich meadows; though the latter will make the fatter and larger cattle, as is seen by those which are brought from the low rich lands in Lincolnshire. But where people are nice in their meat, they will give a much larger price for such as hath been fed on the downs, or in short upland pasture, than for the other, which is much larger. Besides this, dry pastures have an advantage over the meadows, that they may be fed all the winter, and are not so subject to poach in wet weather; nor will there be so many bad weeds produced; which are great advantages, and do in a great measure recompense for the smallness of the crop.

We have already mentioned the advantages of meadow land, or such as is capable of being overflowed with water, and given directions for draining and improving low pasture land, under the article *MEADOW*; therefore shall not repeat that here, but just mention some methods for improving of upland pasture.

The first improvement of upland pasture is, by fencing it, and dividing it into small fields of four, five, six, eight, or ten, acres each, planting timber trees in the hedge-rows, which will screen the grass from the dry pinching winds of March, which will prevent the grass from growing in large open lands; so that if April proves a dry month, the land produces very little hay; whereas in the sheltered fields, the grass will begin to grow early in March, and will cover the ground, and prevent the sun from parching the roots of the grass, whereby it will keep growing, so as to afford a tolerable crop if the spring should prove dry. But in fencing of land the inclosure must not be made too small, especially where the hedge-rows are planted with trees; because, when the trees are advanced to a considerable height, they will spread over the land; and where they are close, will render the grass sour; so that instead of being of an advantage, it will greatly injure the pasture.

The next improvement of upland pasture is, to make the turf good, where, either from the badness of the soil, or for want of proper care, the grass hath been destroyed by rushes, bushes, or mole-hills. Where the surface of the land is clayey and cold, it may be improved by paring it off, and burning it; but if it is an hot sandy land, then chalk, lime, marle, or clay, are very proper manures to lay upon it; but this should be laid in pretty good quantities, otherwise it will be of little service to the land.

If the ground is over-run with bushes or rushes, it will be of great advantage to the land to grab them up towards the latter part of summer, and after they are dried to burn them, and spread the ashes over the ground just before the autumnal rains; at which time the surface of the land should be levelled, and sown with grass-seed, which will come up in a short time, and make good grass the following spring. So also, when the land is full of mole-hills, these should be pared off, and either burnt for the ashes, or spread immediately

Pasture.

[illegible]

But the same may be said of the practice of sowing
grasses with the corn. It is a common practice with
farmers to sow the grasses in this manner, as that
the feed will be as good, if not better, than any natu-
ral grass, and of as long duration. But this is never to
be expected in the common method of sowing a crop
of corn with the grasses; for, wherever this has
been practised, if the corn has succeeded well, the
grasses has been very poor and weak, so that if the land
has not been very good, the grasses has scarcely been
worth saving; for the following year it has produced
but little hay, and the year after the crop is worth
little, either to mow or feed. Nor can it be expected
to be otherwise, for the ground cannot nourish two
crops; and if there were no deficiency in the land, yet
the corn, being the first and most vigorous of growth,
will keep the grasses from making any considerable pro-
gress; so that the plants will be extremely weak, and
but very thin, many of them which come up in the
spring being destroyed by the corn; for whenever there
are roots of corn, it cannot be expected there should
be any grasses. Therefore the grasses must be thin; and
if the land is not in good heart to supply the grasses
with nourishment, that the roots may branch out after
the corn is gone, there cannot be any considerable
crop of clover; and as their roots are biennial, many
of the strongest plants will perish soon after they are
cut; and the weak plants, which had made but little
progress before, will be the principal part of the crop
for the succeeding year; which is many times not
worth standing.

Therefore, when ground is laid down for graze, there should be no crop of any kind sown with the seeds; or at least the crop should be sown very thin, and the land should be well ploughed and cleaned from weeds, otherwise the weeds will come up the first, and grow so strong as to overbear the graze, and if they are not pulled up, will entirely spoil it. The best season to sow the graze seeds upon dry land, when no other crop is sown with them, is about the middle of September or sooner, if there is an appearance of rain: for the ground being then warm, if there happen some good showers of rain after the seed is sown, the graze will soon make its appearance, and get sufficient rooting in the ground before winter: so will not be in danger of having the roots turned out of the ground by frost, especially if the ground is well rolled before the frost comes on, which will press it down, and fix the earth close to the roots. Where this hath not been practised, the frost has often loosened the ground so much, as to let in the air to the roots of the graze, and done it great damage; and this has been brought as an objection to the autumnal sowing of graze; but it will be found to have no weight if the above direction is practised: nor is there any hazard of sowing the graze at this season, but that of dry weather after the seeds are sown; for if the graze comes up well, and the ground is well rolled in the end of October, or the beginning of November, and repeated again the beginning of March, the sward will be closely joined at bottom, and a good crop of hay may be expected

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the

The grass which is sown in these upland pastures seldom degenerate, if the land is tolerably good: whereas the low meadows, which are overflowed in winter, in a few years turn to an harsh rushy grass, though the upland will continue a fine sweet grass for many years without renewing.

There is no part of husbandry of which the farmers are in general more ignorant than that of the pasture: most of them suppose, that when old pasture is plowed up, it can never be brought to have a good sward again; so their common method of managing their land after ploughing, is to sow with their crop of barley some grass seeds as they call them; that is, either the red clover, which they intend to stand two years after the corn is taken off the ground, or rye-grass mixed with trefoil; but as all these are at most but biennial plants,

Pasture. the same summer. But where the ground cannot be prepared for sowing at that season, it may be performed the middle or latter end of March, according to the season's being early or late; for, in backward springs, and in cold land, we have often sowed the grass in the middle of April with success; but there is danger, in sowing late, of dry weather, and especially if the land is light and dry; for we have seen many times the whole surface of the ground removed by strong winds at that season; so that the seeds have been driven in heaps to one side of the field. Therefore, whenever the seeds are sown late in the spring, it will be proper to roll the ground well soon after the seeds are sown, to settle the surface, and prevent its being removed.

The sorts of seeds which are the best for this purpose, are, the best sort of upland hay-seeds, taken from the cleanest pastures, where there are no bad weeds; if this seed is sifted to clean it from rubbish, three bushels will be sufficient to sow an acre of land. The other sort is the *trifolium pratense album*, which is commonly known by the names *white Dutch clover*, or *white honeyfuckle grass*. Eight pounds of this seed will be enough for one acre of land. The grass seed should be sown first, and then the Dutch clover-seed may be afterwards sown; but they should not be mixed together, because the clover seeds being the heaviest will fall to the bottom, and consequently the ground will be unequally sown.

When the seeds are come up, if the land should produce many weeds, these should be drawn out before they grow so tall as to overbear the grass; for where this has been neglected, the weeds have taken such possession of the ground as to keep down the grass, and starve it; and when these weeds have been suffered to remain until they have shed their seeds, the land has been so plentifully stocked with them as entirely to destroy the grass; therefore it is one of the principal parts of husbandry never to suffer weeds to grow on the land.

If the ground is rolled two or three times at proper distances after the grass is up, it will press down the grass, and cause it to make a thicker bottom: for, as the Dutch clover will put out roots from every joint of the branches which are near the ground, so, by pressing down of the stalks, the roots will mat so closely together, as to form a sward so thick as to cover the whole surface of the ground, and form a green carpet, and will better resist the drought. For if we do but examine the common pastures in summer, in most of which there are patches of this white honeyfuckle grass growing naturally, we shall find these patches to be the only verdure remaining in the fields. And this, the farmers in general acknowledge, is the sweetest feed for all sorts of cattle; yet never had any notion of propagating it by seeds, nor has this been long practised in England.

As the white clover is an abiding plant, so it is certainly the very best sort to sow, where pastures are laid down to remain; for as the hay-seeds which are taken from the best pastures will be composed of various sorts of grasses, some of which may be but annual, and others biennial; so, when those go off, there will be many and large patches of ground left bare and naked, if there is not a sufficient quantity of the white

clover to spread over and cover the land. Therefore a good sward can never be expected where this is not sown; for in most of the natural pastures, we find this plant makes no small share of the sward; and it is equally good for wet and dry land, growing naturally upon gravel and clay in most parts of England: which is a plain indication how easily this plant may be cultivated to great advantage in most sorts of land throughout this kingdom.

Therefore the true cause why the land which has been in tillage is not brought to a good turf again, in the usual method of husbandry, is, from the farmers not distinguishing which grasses are annual from those which are perennial: for if annual or biennial grasses are sown, these will of course soon decay; so that, unless where some of their seeds may have ripened and fallen, nothing can be expected on the land but what will naturally come up. Therefore this, with the covetous method of laying down the ground with a crop of corn, has occasioned the general failure of increasing the pasture in many parts of Britain, where it is now much more valuable than any arable land.

After the ground has been sown in the manner before directed, and brought to a good sward, the way to preserve it good is, by constantly rolling the ground with an heavy roller, every spring and autumn, as hath been before directed. This piece of husbandry is rarely practised by farmers; but those who do, find their account in it, for it is of great benefit to the grass. Another thing should also be carefully performed, which is, to cut up docks, dandelion, knapweed, and all such bad weeds, by their roots every spring and autumn; this will increase the quantity of good grass, and preserve the pastures in beauty. Dressing of these pastures every third year is also a good piece of husbandry; for otherwise it cannot be expected the ground should continue to produce good crops. Besides this, it will be necessary to change the seasons of mowing, and not to mow the same ground every year, but to mow one season and feed the next; for where the ground is every year mown, it must be constantly dressed, as are most of the grass grounds near London, otherwise the ground will be soon exhausted.

PATRECI, in mythology, images of gods which the Phœnicians carried on the prows of their galleys. Herodotus, lib. iv. calls them *παλαιοι*. The word is Phœnician, and derived from *pathica*, i. e. *titulus*. See Bocchart's Chanaan, lib. ii. cap. 3. But Scaliger does not agree. Morin derives it from *monkei*, monkey, this animal having been an object of worship among the Egyptians, and hence might have been honoured by their neighbours. Mr Elster has observed, that Herodotus does not call the patreci gods; but that they obtained this dignity from the liberality of Hieronymus and Suidas, and other ancient lexicographers, who place them at the stern of ships; whereas Herodotus placed them at the prow. Scaliger, Bochart, and Selden, have taken some pains about this subject.—Mr Morin has also given us a learned dissertation on this head in the *Mémoires de l'Académie des Inscriptions & Belles Lettres*, tom. i.; but Mr Elster thinks it defective in point of evidence.

PAPAGONIA, a country of South America, comprehending all that country extending from Chili

Pasture
Patagonia.

Patagonia. and Paraguay to the utmost extremity of South America; that is, from 35° almost to 54° of latitude: being surrounded by the countries just mentioned, the South and North Seas, and the Straits of Magellan, which separate it from the island called *Terra del Fuogo*, and extend about 116 leagues in length from sea to sea, but only from half a league to three or four in breadth.

This country had the name of *Terra Magellanica*, from Ferdinand Magellan, a Portuguese officer in the service of the Catholic king, who is reported to have sailed through the straits that also bear his name, from the North to the South Sea, in the year 1519.

The lofty mountains of the Andes, which are covered with snow a great part of the year, traversing the country from north to south, the air is said to be much colder than in the north under the same parallels of latitude. Towards the north, it is said to be covered with wood, and stored with an inexhaustible fund of large timber; whereas, to the southward, not so much as a single tree fit for any mechanical purpose is to be seen: yet there is good pasture, and incredible numbers of wild horned cattle and horses, which were first brought hither by the Spaniards, and have increased amazingly. Fresh water, we are told by some writers, is very scarce; but if that were really the case, it is difficult to conceive how the present inhabitants and such multitudes of cattle could subsist. The east coast is mostly low land, with few or no good harbours: one of the best is Port St Julian.

Patagonia is inhabited by a variety of Indian tribes; as the Patagons, from which the country takes its name; the Pampas, the Coslares, &c. of whom we know very little. Only it appears, from the accounts of former voyagers, lately confirmed by Commodore Byron and his crew, and the testimonies of other navigators, that some of them are of a gigantic stature, and clothed with skins; but it would seem that there are others who go almost quite naked, notwithstanding the inclemency of the climate. Some of them also, that live about the Straits, if we may credit the navigators who have passed that way into the South Sea, are perfect savages: but those with whom Commodore Byron and his people conversed, are represented as of a more gentle, humane disposition; only, like other savages, they live on fish and game, and what the earth produces spontaneously.

The Spaniards once built a fort upon the Straits, and left a garrison in it, to prevent any other European nation passing that way into the South Sea: but most of the men perished by famine, whence the place obtained the name of *Port Famine*; and no people have attempted to plant colonies here ever since.

About the middle of the Strait is a promontory called *Cape Froisard*, which is the most southerly on the continent of South America.

On the coasts of Patagonia lie a great number of islands, or clusters of islands. On the west coasts are the islands *Maidre de Dios*, *Santa Trinidad*, *Santa Cruz*, the *Isles of the Chunians* and *Huillana*, the *Sarmientos*, and many others; to the number of 80 in all, as some say. Of those on the south coast, the most considerable are *Terra del Fuogo*, and *Staten Land*. See these articles.

A vast deal has been said respecting the stature of

the Patagonians, by people of different nations, and on various occasions. We shall insert the following letter from Mr Charles Clarke, who was on board Byron's ship in 1764, and gave this account to Dr Mat-
Patagoni

"We had not got above 10 or 12 leagues into the straits of Magellan, from the Atlantic Ocean, before we saw several people, some on horse back, some on foot, upon the north shore (continent), and with the help of our glasses could perceive them beckoning to us to come on shore, and at the same time obnoxious to each other, that they seemed to be of an extraordinary size: However, we continued to stand on, and should have passed without taking the least farther notice of them, could we have proceeded; but our breeze dying away, and the tide making against us, we were obliged to anchor; when the Commodore ordered his boat of 12 oars, and another of six, to be hoisted out, manned and armed. In the first went the Commodore, in the other Mr Cummins, our first lieutenant, and myself. At our first leaving the ship, their number did not exceed 40; but as we approached the shore, we perceived them pouring down from all quarters, some galloping, others running, all making use of their utmost expedition. They collected themselves into a body just at the place we steered off for. When we had got within 12 or 14 yards of the beach, we found it a disagreeable flat shore, with very large stones, which we apprehended would injure the boats; so looked at two or three different places to find the most convenient for landing. They supposed we deferred coming on shore through apprehensions of danger from them; upon which they all threw open the skins which were over their shoulders, which was the only clothing they had, and consequently the only thing they could secret any kind of arms with, and many of them lay down close to the water's edge.—The Commodore made a motion for them to go a little way from the water, that we might have room to land, which they immediately complied with, and withdrew 30 or 40 yards; we then landed, and formed each man with his musket, in case any violence should be offered. As soon as we were formed, the Commodore went from us to them, then at about 20 yards distance: they seemed vastly happy at his going among them, immediately gathered round him, and made a rude kind of noise, which I believe was their method of singing, as their countenances bespoke it a species of jollity. The Commodore then made a motion to them to sit down, which they did in a circle, with him in the middle, when Mr Byron took some beads and ribbons; which he had brought for that purpose, and tied about the womens necks, with which they seemed infinitely pleased. We were struck with the greatest astonishment at the sight of people of such a gigantic stature, notwithstanding our previous notice with glasses from the ship. Their body was increased, by the time we got in there, to the number of 500, men, women, and children. The men and women both rid in the same manner; the women had a kind of belt to close their skins round the waist, which the men had not, as theirs were only flung over their shoulders, and tied with two little slips, cut from the skin, round the neck. At the time of the Commodore's motion for them to retire farther up the beach, they all

Patagonia. all dismounted, and turned their horses loose, which were gentle, and stood very quietly. The Commodore having disposed of all his presents, and satiated his curiosity, thought proper to retire; but they were vainly anxious to have him go up into the country to eat with them. That they wanted him to go with them to eat, we could very well understand by their motion, but their language was wholly unintelligible to us.—There was a very great smoke to which they pointed about a mile from us, where there must have been several fires; but some intervening hills prevented our seeing any thing but the smoke. The Commodore returned the compliment, by inviting them on board the ship; but they would not favour him with their company; so we embarked, and returned to the ship. We were with them near two hours at noon-day, within a very few yards, tho' none had the honour of shaking hands but Mr Byron and Mr Cummins; however, we were near enough, and long enough with them, to convince our senses, so far as not to be cavilled out of the very existence of those senses at that time, which some of our countrymen and friends would absolutely attempt to do. They are of a copper colour, with long black hair, and some of them are certainly nine feet, if they do not exceed it. The Commodore, who is very near six feet, could but just reach the top of one of their heads, which he attempted on tip-toes, and there were several taller than him, on whom the experiment was tried. They are prodigious stout, and as well and as proportionally made as ever I saw people in my life. That they have some kind of arms among them, is, I think, indubitable, from their taking methods to convince us they had none at that time about them. The women, I think, bear much the same proportion to the men as our Europeans do; there was hardly a man there less than eight feet, most of them considerably more. The women, I believe, run from seven and an half to eight feet.—Their horses were stout and bony, but not remarkably tall; they are, in my opinion, from 15 to 15½ hands. They had a great number of dogs, about the size of a middling pointer, with a fox nose. They continued on the beach till we got under way, which was two hours after we got on board. I believe they had some expectations of our returning again; but as soon as they saw us getting off, they betook themselves to the country.

“The country of Patagonia is rather hilly, though not remarkably so. You have here and there a ridge of hills, but no very high ones. We lay some time at Port Desire, which is not a great way to the northward of the Straits, where we traversed the country many miles round. We found fire-brands in different places, which convinced us there had been people, and we suppose them to have been the Patagonians. The soil is sandy, produces nothing but a coarse harsh grass, and a few small shrubs, of which Sir John Naborough remarked, he could not find one of size enough to make the helve of a hatchet; which observation we found very just. It was some time in the winter we made this visit to our gigantic friends. I am debarred being so particular as I could wish, from the loss of my journals, which were demanded by their Lordships of the Admiralty immediately upon our return.”

That the whole of this account is true, we cannot assert; but that the writer has been misled in some respects, and misinformed with regard to some of his facts, is at least probable: for Captain Wallis, who went out to the Straits of Magellan after Byron's return, gives a different turn to many of the observations; and with respect to the nature of the people, he differs very materially. We shall give the following epitome of his remarks on what occurred to him.—He had three ships with him, which entered the Straits on the 16th December 1768, and came to an anchor in a bay south of Cape Virgin Mary, where they were immediately accosted by a whole troop of Patagonians, who made signs for them to come on shore. The Captain, having made previous dispositions for the security of his men in case of an attack, manned all the boats belonging to the three ships, and with a party of marines landed on the beach where those giants had assembled. The commanders of the three ships, and most of their officers, were of this party. On their leaping ashore, the Indians seemed to welcome them; and being by signs desired to retreat, they all fell back, and made room for the marines to form. When they were drawn up, Captain Wallis advanced, and by signs directed the Indians to seat themselves in a semicircle, which they readily understood and obeyed. He then distributed among them knives, scissars, buttons, beads, combs, and particularly ribbons, with which he complimented the women, who received them with a mixture of pleasure and respect. He then gave them to understand that he had still more valuable articles to bestow, and showed them axes and bill-hooks; but, at the same time, pointed to some gaudicous and ostriches, intimating that he expected some of those in return; but they either did not, or would not, understand him; so that no traffic took place.

The whole company that were assembled on this occasion, had each a horse, with a saddle and bridle. The saddle had a sort of stirrups, and the bridle was made of thongs of leather very well put together, for the purpose of guiding the horses. The women, as well as the men, rode astride. The men, in general, wore each a wooden spur; but one of them had a large pair of Spanish spurs, brass stirrups and a Spanish scimitar. Their horses were nimble and spirited, but small in proportion to their riders, seemingly not above 14 hands high. Their dogs were of the Spanish breed. The Captain, having purposely provided himself with measuring rods, found that the tallest man among them measured only six feet seven inches high; several were within an inch or two as tall; but the ordinary size was from five feet ten inches to six feet. It is pity that none of our voyagers thought of measuring the whole size of one of those gigantic men. They tell us, indeed, that they are well made, that they are proportionally large, and that they are robust and bony; but they give us no criterion to judge of their bulk, nor one instance of their extraordinary strength. As they are represented not only peaceable, but remarkably tractable, some trials might have been made of the weight they could have lifted, and how much they could exceed in that respect the strongest man in the ships. This, in a great measure, would have determined the point, which is yet left doubtful by the different relations that are given by the different voyagers

Patagonia. who have seen these people, no two of them agreeing in the same description. All agree, however, that their hair is black, and harsh like bristles; that they are of a dark-copper colour, and that their features are rather less fine than ours; that they clothe themselves decently with the skins of guanicoes; that they paint themselves variously; and there is reason to suspect, that by that variety they distinguish their tribes. Those seen by Commodore Byron were painted round both eyes, no two of them alike; those seen by Captain Wallis had only a red circle round the left eye; and those seen by Bougainville had no circle round the eyes, but had their cheeks painted red. This may account for the different reports of voyagers concerning their stature: it is not impossible, nay, it is very probable, that they may vary in this particular, according to their tribes; as is seen in the Highlands of Scotland, where one clan of the Campbells is remarkably tall, and another of the Frasers remarkably short. Were it not for some such natural discrimination, there could not be so wide a difference in the description of gentlemen, who, having no ends to serve either in falsifying one another's reports, or in imposing upon the public, cannot be supposed to mistake willfully.

One remarkable observation made by our voyagers must not be omitted; and that is, that though our people could distinguish but one word of their language, which the English pronounce *chewow*, and the French *chouan*, yet the Patagonians could repeat whole sentences after our men more distinctly than almost any European foreigner of what nation soever. This appears the more singular, as, among the islanders between the Tropics, it was hardly possible to make them articulate any of our words. Sydney Parkinson, in a specimen he has given us, says, that though the English remained at Otcheitee three months, the nearest the natives could approach the sound of *Cooke* was *Toote*; *Banks*, *Opam*; *Solander*, *Tolano*; *Gore*, *Towara*; *Monkhouse*, *Mata*; and so of the rest: whereas the Patagonians presently got by heart this sentence of invitation, *Come shore, Englishmen!* which they showed they well understood, by repeating it afterwards whenever the ships came so near the shore as to be within call.

Another very remarkable particular is, that they had none of the characters of a ferocious people; there was no offensive weapon among them, except the scimitar already mentioned. The men, indeed, had a kind of sling, which they use in hunting, consisting of two round stones of about a pound weight each, connected together by a thong. These stones were fastened to the extremities of the thong; and, when they threw them, they held one stone in the hand, and swung the other about the head. "They are so expert in the management of this double-headed shot (says the writer of the voyage), that they will hit a mark not bigger than a shilling with both these stones at the distance of fifteen yards; but their method of availing themselves of their dexterity against the guanicoe and ostrich is, to sling the stones so as to entangle their legs, by which means they are retarded in their flight, and easily overtaken. Bougainville speaks of these slings as common among other Indian nations in South America; but we do not remember to have seen this assertion confirmed by any other voyager.

These people certainly dress differently as well as paint differently; for the dress described by Bougainville is very unlike the dress of those seen by the English voyagers. Captain Wallis invited some of them on board his ship: but, among all the wonders that were shown them, none seemed to attract their notice so much as the looking glasses: they looked in the glasses and at each other; they laughed and gazed, and gazed again and laughed; in short, there was no end to their merriment when in possession of this article of curiosity. They eat whatever was given them, but would drink nothing but water. In this they differ from all the tribes of Indians in North America, who are immoderately fond of spirituous liquors. They admired the European sheep, hogs, and poultry; but did not seem over-desirous of any thing they saw except clothes. When the marines were exercised to entertain them, they appeared disconcerted; an old man among them made signs, by striking his breast, and tumbling down and lying as if he had been dead upon deck, that he knew the effect of their guns; and none of them seemed easy till the firing was over. When the Captain had satisfied his own curiosity, and, as he imagined, theirs, he gave them to understand, that he was going to sail, and that they must depart; which they were very unwilling to do. However, having given each of them a canvas bag, with some needles ready threaded, a knife, a pair of scissars, a few beads, a comb, and a looking-glass, he dismissed them, with great reluctance on their part, particularly on that of the old man's, who by very significant signs expressed his desire to stay till sunset.

PATAGONULA, in botany; a genus of the monogynia order, and of the pentandria class of plants. The characters are these: the cup is an extremely small perianthium, divided into five segments, and remains after the flower is fallen; the flower consists of a single petal, with almost no tube, the margin of which is divided into five acute oval segments; the stamina are five filaments of the length of the flower; the antheræ simple; the germen of the pistil is oval and pointed; the style is slender and slightly bifid, its ramifications are also bifid; this is of the same length with the stamina, and remains when the flower is fallen; the stigmata are simple; the fruit is an oval and pointed capsule, standing on a large cup, made up of five long segments emarginated or rimmed round their edges; the seeds of this plant are yet unknown; but the construction of the cup, in which the capsule stands, is alone a sufficient distinction for this genus. There is but a single species.

PATAN, a kingdom of Asia, in the East Indies, and in the peninsula of Malacca, and on the eastern coast between the kingdoms of Siam and Paha. The inhabitants are partly Mahometans and partly Gentoos; but they are all very voluptuous. The air is wholesome, though very hot; and they have no seasons but the winter and summer. The former is more properly the rainy season; and contains the months of November, December, and January. The woods are full of elephants and many wild animals. Some voyagers pretend that this country is governed by a queen, who never marries, but may have as many gallants as she pleases. They have some trade with the Chinese; and the principal town is of the same name, which is one

Patan of the strongest in these parts, having a well defended harbour.

PATAN, a town of Asia, an! capital of a province of the same name, in the dominions of the Great Mogul; it is very little known. E. Long. 100. 0. N. Lat. 27. 30.

PATAVINITY, among critics, denotes a peculiarity of Livy's diction; derived from Patavium or Padua, the place of his nativity; but wherein this patavinity consists, they are by no means agreed.

Asinius Pollio, according to Quintilian, taxed Livy with patavinity. But what he meant by this censure we believe no man can say. Morhof believes it to be a singular turn of expression, and some phrases peculiar to the Paduense. All we certainly know about it is, that it was a fault in the language of Livy, not in the sentiments or manners. In all probability, it is one of those delicacies that are lost in a dead language. Dan. Georg. Morhof published a treatise *De Patavinitate Liviana*, at Kiel, in 1685, where he explains, very learnedly, the urbanity and peregrinity of the Latin tongue.

PATARA, (Livy, Mela); the capital of Lycia, to the east of the mouth of the river Xanthus; famous for a temple and oracle of Apollo, thence called *Pataneus*, three syllables only; but *Pataraeus*, (Horace). For the six winter months, Apollo gave answers at Patara; and for the six summer at Delos, (Virgil, Servius): these are the *Lycia Sortes* of Virgil. The town was situated in a peninsula, called *Liciorum Cherfoneus*, (Stephanus). Acts xxi. 1. St Paul in his passage from Philippi to Jerusalem, came to Miletus, hence to Coos, then to Rhodes, and from Rhodes to Patara; where having found a ship that was bound for Phoenicia, he went on board and arrived at Jerusalem, to be at the feast of Pentecost.

PATAVIUM (Tacitus, Strabo), a town of the Transpadana, situated on the left or north bank of the Medoacus Minor; founded by Antenor the Trojan, (Mela, Virgil, Seneca); *Patavini*, the people, (Livy); who himself was a native, and by Asinius Pollio charged with patavinity. Now *Padua*, in the territory and to the west of Venice. E. Long. 12. 15. N. Lat. 45. 30.

PATAY, a town of France, in the province of Orleans, remarkable for the defeat of the English in 1429, and where Joan of Arc did wonders. E. Long. 1. 43. N. Lat. 48. 5.

PATE, in fortification, a kind of platform, resembling what is called an *horse's pie*.

PATEE, or **PATTEE**, in heraldry, a cross, small in the centre, and widening to the extremities, which are very broad.

PATELLA, or **KNEE-PAN**, in anatomy. See there, n^o 59.

PATELLA, or **LIMPET**, a genus of insects belonging to the order of vermes testacea; the animal kind of the snail kind. The shells are of that class which is called *univalves*; they have no *contour*, and are in the form of little pointed cones. They are always attached to some hard body. Their summit is sometimes acute, sometimes obtuse, flattened back, or perforated. The rock or other hard body to which they are always found adhering, serves as a kind of second or under shell to preserve them from injury; and for this reason Aldrovandus and Rondelet have classed them among the bivalves; but in this error they have not been followed by any other writer. Fabius

Columna distinguishes four sorts of the *lepas* or limpets: *lepas vulgaris*, a sort very common at Naples, of an oval figure and ash colour. *Lepas major caotica*, which comes from Spain, the shell is hard, thick, and ribbed in angles, and the rim is denticulated. The *lepas agrea*, or *symplesis*, which is a small shell, irregularly oval, of an ash colour, marked with radii and zones crossing each other, and perforated at the top by an aperture which serves the fish for a vent. And the *patella regalis*, *quia regis mensa fit digna*; this is of a mother-of-pearl colour within, and is ribbed and perforated in many places: these shells have been found on the back of the sea tortoise, or turtle, and on a large pinna marina. The distinguishing mark or characteristic of the *lepas* is to have but one convex shell, which adheres by its rim to a rock, or some other hard substance. There are 36 species of this genus, which are principally distinguished by peculiarities in their shells. Of some of these shells we have given engravings in Plate CCCLXXII. of which we add the following description:

The limpet marked 1. has large yellow furrows and ridges from the centre to the circumference, which is indented; the eye is perfectly white, and shaped like a nipple.

That marked 2. is perfectly smooth, but radiated with brown streaks, and perforated in the summit.

Fig. 3. is ribbed, and indented at the circumference; its coat is spotted with brown, in a zig-zag form, and its eye is of a ruby colour.

Fig. 4. is a small brown shell, the ribs or striæ of which are armed with small white points.

Fig. 5. is striated with radii, reaching from the eye to the circumference, which are crossed by other streaks nearly parallel to the circumference; it is of the usual colour, and its eye is perforated.

Fig. 6. This is white, shaped something like an hand-bell, and has within a protuberance somewhat resembling a clapper.

Fig. 7. is a seven-sided limpet, divided at each angle by ridges from the summit, which form a star on a white ground, variegated with black spots.

Fig. 8. is a small ribbed shell, of a brown colour, and rough; it has a chamber, and a beak-fashioned eye placed at one of its extremities.

Fig. 9. is the finest shell of this species: its size, the fine mother-of-pearl colour on the inside, and the beauty of its red spots without, which have the appearance of tortoise-shell, give it the pre-eminence over all others. It is called the *Tortoise shell buckler*.

The wild limpet, or *patella fera*, is a name very improperly applied by Rondeletius and Aldrovand to the *auris marina*, or *concha veneris*, which certainly is not of the *patella* kind.

PATELLA, in the History of Insects, a name given by Lister and other authors to a little husk or shell, found on the bark of the cherry, plum, rose, and other trees, containing an animal within, and useful in colouring. These *patellæ* are of the form of globes, except when they adhere to the tree, and are for the most part of a shining chestnut colour. The husk itself strikes a very fine crimson colour on paper, and within it is found a white maggot which is of no value: this, in time, hatches into a very small but beautiful bee. The size of this bee is about half that of an ant.

Patella

Patera

ant. They have a sting like bees, and three spots placed in a triangle on the forehead, which are supposed to be eyes. They are of a black colour, and have a large round whitish or pale yellow spot on the back. The upper pair of wings are shaded and spotted, but the under pair are clear. It might be worth while to try the shells or husks in order to discover whether the colour they yield might not be useful. It is to be remarked, that the deepest coloured husks afford the finest and deepest purple: they must be used while the animal in them is in the maggot form; for when it is changed into the bee state the shell is dry and colourless. Lister, who first observed these patellæ, went so far on comparing them with the common kermes, as to assert that they were of the same nature with that production: but his account of their being the workmanship of a bee, to preserve her young maggot in, is not agreeable to the true history of the kermes; for that is an insect of a very peculiar kind. He has in other instances been too justly censured for his precipitancy of judging of things, and perhaps has fallen into an error by means of it here. It is very possible that these patellæ may be the same sort of animals with the kermes, but then it produces its young within this shell or husk, which is no other than the skin of the body of the mother animal; but as there are many flies whose worms or maggots are lodged in the bodies of other animals, it may be that this little bee may love to lay its egg in the body of the proper insect, and the maggot hatched from that egg may eat up the proper progeny, and, undergoing its own natural changes there, issue out at length in form of the bee. This may have been the case in some few which Dr Lister examined; and he may have been misled by this to suppose it the natural change of the insect.

PATENT, in general, denotes something that stands open or expanded: thus a leaf is said to be patent, when it stands almost at right angles with the stalk.

PATENT, or *Letters Patent*. See LETTER.

PATER NOSTER, the *Lord's Prayer*, so called from the two first words thereof in Latin.

PATER Noster, islands of Asia, in the East Indian sea, so called because of the great number of rocks, which sailors have likened to the beads with which the Papists tell their pater-noster. They abound in corn and fruits, and are very populous.

PATER Patratus, was the name of the first and principal person the college of heralds called *Feciales*. Some say the Pater Patratus was a constant officer and perpetual chief of that body; and others suppose him to have been a temporary minister, elected upon account of making peace or denouncing war, which were both done by him. See FECIALES.

PATERA, among antiquaries, a goblet or vessel used by the Romans in their sacrifices; wherein they offered their consecrated meats to the gods, and where-with they made libations. See SACRIFICE and LIBATION.

The word is Latin, formed from *pateo*, "I am open;" *quod pateat*, "because it has a great aperture;" in contradistinction to bottles, &c. which have only narrow necks, or whose aperture is less than the body of the vessel.

On medals the patera is seen in the hands of several

deities; and frequently in the hands of princes, to mark the sacerdotal authority joined with the imperial, &c.

Hence F. Joubert observes, that beside the patera, there is frequently an altar upon which the patera seems to be pouring its contents.

The patera was of gold, silver, marble, brass, glass, or earth; and they used to inclose it in urns with the ashes of the deceased, after it had served for the libations of the wine and liquors at the funeral.

The patera is an ornament in architecture, frequently seen in the Doric frieze, and the tympanum of arches; and they are sometimes used by themselves, to ornament a space; and in this case it is common to hang a string of husks or drapery over them: sometimes they are much enriched with foliage, and have a mask or a head in the centre.

PATERCULUS (Caius Velleius), an ancient Roman historian, who flourished in the reign of Tiberius Cæsar, was born in the year of Rome 735. His ancestors were illustrious for their merit and their offices. His grandfather espoused the party of Tiberius Nero, the emperor's father; but being old and infirm, and not able to accompany Nero when he retired from Naples, he ran himself through with his sword. His father was a soldier of rank, and so was Paterculus himself. He was a military tribune when Caius Cæsar, a grandson of Augustus, had an interview with the king of the Parthians, in an island of the river Euphrates, in the year 753. He commanded the cavalry in Germany under Tiberius; and accompanied that prince for nine years successively in all his expeditions. He received honourable rewards from him; but we do not find that he was preferred to any higher dignity than the prætorship. The praises he bestows upon Sejanus give some probability to the conjecture, that he was looked upon as a friend of this favourite, and consequently that he was involved in his ruin. His death is placed by Mr Dodwell in the year of Rome 784, when he was in his 54th year.

He wrote an Abridgement of the Roman History in two books, which is very curious. His purpose was only to deduce things from the foundation of Rome to the time wherein he lived; but he began his work with things previous to that memorable era: for, though the beginning of his first book is wanting, we yet find in what remains of it, an account of many cities more ancient than Rome. He promised a large history; and no doubt would have executed it well: for during his military expeditions he had seen, as he tells us, the provinces of Thrace, Macedonia, Achaia, Asia Minor, and other more easterly regions; especially upon the shores of the Euxine sea, which had furnished his mind with much entertaining and useful knowledge. In the Abridgement which we have, many particulars are related that are nowhere else to be found; and this makes it the more valuable. The style of Paterculus, though miserably disguised through the carelessness of transcribers, and impossible to be restored to purity for want of manuscripts, is yet manifestly worthy of his age, which was the time of pure Latinity. The greatest excellence of this historian lies in his manner of commending and blaming those he speaks of; which he does in the finest terms and most delicate expressions. He is, however, condemned, and indeed with the greatest

greatest reason, for his partiality to the house of Augustus; and for making the most extravagant eulogies, not only upon Tiberius, but even upon his favourite Sejanus: whom, though a vile and cruel monster, Paterculus celebrates as one of the most excellent persons the Roman commonwealth had produced. Lippius, though he praises him in other respects, yet censures him most severely for his insincerity and partiality. "Velleius Paterculus (says he) raises my indignation: he represents Sejanus as endowed with all good qualities. The impudence of this historian! But we know that he was born, and died, to the destruction of mankind. After many commendations, he concludes, that Livia was a woman more resembling the gods than men: and as to Tiberius, he thinks it a crime to speak otherwise of him than as of an immortal Jove. What sincere and honest mind can bear this? On the other hand, how artfully does he every where conceal the great qualities of Cæsar Germanicus! How obliquely does he ruin the reputation of Agrippina and others, whom Tiberius was thought to hate! In short, he is nothing but a court-prostitute. You will say, perhaps, it was unsafe to speak the truth at those times: I grant it; but if he could not write the truth, he ought not to have written lies: none are called to account for silence." La Mothe le Vayer has made a very just remark upon this occasion: "The same fault (says he) may be observed in many others, who have written the history of their own times, with a design to be published while they lived."

It is strange, that a work so elegant and worthy to be preserved, and of which, by reason of its shortness, copies might be so easily taken, should have been so near being lost. One manuscript only has had the luck to be found, as well of this author among the Latins as of Hesychius among the Greeks: in which, says a great critic of our own nation, "The faults of the scribes are found so numerous, and the defects so beyond all redress, that notwithstanding the pains of the learned and most acute critics for two whole centuries, these books still are, and are like to continue, a mere heap of errors." No ancient author but Priscian makes mention of Paterculus: the moderns have done him infinitely more justice, and have illustrated him with notes and commentaries. He was first published, from the manuscript of Morlae, by Rhenanus, at Basil in 1520: afterwards by Lippius at Leyden in 1581; then by Gerard Vossius in 1630; next by Boeclerus at Strasburg in 1642; then by Thylius and others; and, lastly, by Peter Burman at Leyden, 1719, in 8vo. To the Oxford edition in 1693, 8vo, were prefixed the *Annales Velleiani* of Mr Dodwell, which show deep learning and a great knowledge of antiquity.

PATH, in general, denotes the course or track marked out or run over by a body in motion.

For the path of the moon, &c. see **ASTRONOMY**, n° 359, 360.

PATHETIC, whatever relates to the passions, or that is proper to excite or awake them. The word comes from the Greek *πάθος*, *passion* or *emotion*. See **PASSION**.

PATHETIC, in music, something very moving, expressive, or passionate; capable of exciting pity, compassion, anger, or other passions. Thus we speak of the pathetic style, a pathetic figure, pathetic song, &c.

The chromatic genus, with its greater and lesser semitones, either ascending or descending, is very proper for the pathetic; as is also an artful management of discords; with a variety of motions, now brisk, now languishing, now swift, now slow.

Nieuwentijt speaks of a musician at Venice who so excelled in the pathetic, that he was able to play any of his auditors into distraction: he says also, that the great means he made use of was the variety of motions, &c.

PATHOGNOMONIC, among physicians, an appellation for a symptom, or conourse of symptoms, that are inseparable from a distemper, and are found in that only, and in no other.

PATHOLOGY, that part of medicine which explains the nature of diseases, their causes and symptoms. See **MEDICINE**.

PATHOS, a Greek term, literally signifying passion.

PATHROS, a city and canton of Egypt, of which the prophets Jeremiah and Ezekiel make mention; Jerem. xlii. 1. 15. Ezek. xxix. 14. xxx. 14. We do not very well know its situation, though Pliny and Ptolemy the geographer speak of it by the name of Phaturis; and it appears to have been in Upper Egypt. Isaiah (xii. 2.) calls it Pathros; and it is the country of the Pathrusim, the posterity of Mizraim, of whom Moses speaks, Gen. x. 14. Ezekiel threatens them with an entire ruin. The Jews retired thither notwithstanding the remonstrances of Jeremiah; and the Lord says by Isaiah, that he will bring them back from thence.

PATIENCE, that calm and unroffed temper with which a good man bears the evils of life, from a conviction that they are at least permitted, if not sent, by the best of Beings, who makes all things work together for good to those who love and fear him.

The evils by which life is embittered may be reduced to these four: 1. Natural evils, or those to which we are by nature subject as men, and as perishable animals. The greatest of these are, the death of those whom we love, and of ourselves. 2. Those from which we might be exempted by a virtuous and prudent conduct, but which are the inseparable consequences of imprudence or vice, which we shall call punishments; as infamy proceeding from fraud, poverty from prodigality, debility and disease from intemperance. 3. Those by which the fortitude of the good are exercised; such as the persecutions raised against them by the wicked. To these may be added, 4. The opposition against which we must perpetually struggle, arising from the diversity of sentiments, manners, and characters of the persons among whom we live.

Under all these evils patience is not only necessary but useful: it is necessary, because the laws of nature have made it a duty, and to murmur against natural events is to affront providence; it is useful, because it renders our sufferings lighter, shorter, and less dangerous.

Is your reputation sullied by invidious calumnies? rejoice that your character cannot suffer but by false imputations. You are arraigned in a court of judicature, and are unjustly condemned: passion has influenced both your prosecutor and your judge, and you cannot forbear repining that you suffer although innocent.

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Patience.

Patience.

But would it have been better that you should have followed being guilty? Would the greatest misfortune that can befall a virtuous man be to you a consolation? The opulence of a villain, the elevated station to which he is raised, and the honours that are paid to him, excite your jealousy, and fill your bosom with repinings and regret. What! say you, are riches, dignity, and power, reserved for such wretches as this? Cease these groundless murmurs. If the possessions you regret were real benefits, they would be taken from the wicked and transferred to you. What! would you say of a successful hero, who, having delivered his country, should complain that his services were ill requited, because a few sugar-plums were distributed to some children in his presence, of which they had not offered him a share? Ridiculous as this would appear, your complaints are no better founded. Has the Lord of all no reward to confer on you but perishable riches and empty precarious honour?

It is fancy, not the reason of things, that makes life so uneasy to us. It is not the place nor the condition, but the mind alone, that can make any body happy or miserable.

He that values himself upon conscience, not opinion, never needs repentance. When we are evil spoken of, if we have not deserved it, we are never the worse; if we have, we should mend.

Tiberius the Roman emperor, at the beginning of his reign, acted in most things like a truly generous, good-natured, and clement prince. All sanderous reports, libels, and lampoons upon him and his administration, he bore with extraordinary patience; saying, "That in a free state the thoughts and tongues of every man ought to be free;" and when the senate would have proceeded against some who had published libels against him, he would not consent to it; saying, "We have not time enough to attend to such trifles: if you once open a door to such informations, you will be able to do nothing else; for under that pretence every man will revenge himself upon his enemies by accusing them to you." Being informed that one had spoken detractingly of him: "If he speaks ill of me," says he, "I will give him as good an account of my words and actions as I can; and if that is not sufficient, I will satisfy myself with having as bad an opinion of him as he has of me." Thus far even Tiberius may be an example to others.

Men will have the same veneration for a person that suffers adversity without dejection, as for demolished temples, the very ruins whereof are revered and adored.

A virtuous and well-disposed person, is like to gold and steel; the more he is tried, the more he is valued; the more he is opposed, the more he is approved: wrongs may well try him and touch him, but cannot imprint in him any false stamp.

The man therefore who possesses this virtue (patience), in this ample sense of it, stands upon an eminence, and sees human things below him: the tempest indeed may reach him; but he stands secure and collected against it upon the basis of conscious virtue, which the severest storms can seldom shake, and never overthrow.

Patience, however, is by no means incompatible with sensibility, which, with all its inconveniences, is to be cherished by those who understand and wish to

maintain the dignity of their nature. To feel for others, disposes us to exercise the amiable virtue of charity, which our religion indispensably requires. It constitutes that enlarged benevolence which philosophy inculcates, and which is indeed comprehended in Christian charity. It is the privilege and the ornament of man; and the pain which it causes is abundantly recompensed by that sweet sensation which ever accompanies the exercise of beneficence.

To feel our own misery with full force is not to be deprecated. Affliction softens and improves the heart. Tears, to speak in the style of nature, fertilize the soil in which the virtues grow. And it is the remark of one who understood human nature, that the faculties of the mind, as well as the feelings of the heart, are meliorated by adversity.

But in order to promote these ends, our sufferings must not be permitted to overwhelm us. We must oppose them with the arms of reason and religion; and to express the idea in the language of the philosopher, as well as the poet, of Nature, every one, while he is compelled to feel his misfortunes like a man, should resolve also to bear them like a man.

Resign'd in ev'ry state,

With patience bear, with prudence push, your fate;
By suffering well our fortune we pursue,
Fly when she frowns, and when she calls pursue.

PATIGUMO (a corruption of the words *pate-de-guimauve*); the name of a sort of paste or cakes much used on the continent as an agreeable and useful remedy for catarrhal defluxions, and supposed by Dr Percival to consist of gum-arabic combined with sugar and the whites of eggs (see the article **HUNGER**, p. 715, col. 1.) But we have been informed that the powdered substance of the marshmallow is the chief ingredient of the composition.

PATIN (Guy), professor of physic in the royal college of Paris, was born in 1602. He made his way into the world merely by the force of his genius, being at first corrector of a printing-house. He was a man of great wit and erudition: he spoke with the gravity of a Stoic, but his expressions were very satirical. He hated bigotry, superstition, and knavery; had an upright soul, and a well-disposed heart. He was a most tender father, courteous to every body, and polite in the highest degree. He died in 1672, and did not owe his reputation to any writings published in his lifetime upon physic; but his letters which appeared after his death have rendered his name very famous. He left a son mentioned in the ensuing article.

PATIN (Charles), who made a great figure in the world, and excelled in the knowledge of medals. He was born in Paris in 1633; and made so surprising a progress, that he maintained theses in Greek and Latin, on all parts of philosophy, in 1647. He studied the law in compliance to an uncle, and was admitted an advocate in the parliament of Paris; but could not law while that of physic, for which he always had an inclination. He therefore quitted the law, and devoted himself to physic; in which, after taking the doctor's degree, he applied himself to practice with great success. He afterwards travelled into Germany, Holland, England, Switzerland, and Italy. In 1676 he was appointed

Patience

Patin.

Patkul. appointed professor of physic in Padua; and three years after was created a knight of St Mark. He died in that city in 1694. His works are many, and well known to the learned world. His wife too, and his daughters, were authoresses.

PATKUL (John Reinhold), was born of a noble family in Livonia, a northern province belonging to the crown of Sweden. The Livonians having been stript of their privileges, and great part of their estates, by Charles XI. Patkul was deputed to make their complaint; which he did with such eloquence and courage, that the king, laying his hand upon his shoulder, said, 'You have spoken for your country as a brave man should, and I esteem you for it.'

Charles, however, who added the baseness of hypocrisy to the ferocity of a tyrant, was determined to punish the zeal and honesty which he thought fit to commend; and a few days afterwards caused Patkul to be declared guilty of high treason, and condemned to die. Patkul, however, found means to escape into Poland, where he continued till Charles was dead. He hoped that his sentence would have been then reversed, as it had been declared unjust even by the tyrant that procured it: but being disappointed in this expectation, he applied to Augustus king of Poland, and solicited him to attempt the conquest of Livonia from the Swedes; which, he said, might be easily effected, as the people were ready to shake off their yoke, and the king of Sweden was a child incapable of compelling their subjection.

Augustus possessed himself of Livonia in consequence of this proposal; and afterwards, when Charles XII. entered the province to recover it, Patkul commanded in the Saxon army against him. Charles was victorious; and Patkul, some time afterwards, being disgusted at the haughty behaviour of General Fleming, Augustus's favourite, entered into the service of the Czar, with whom Augustus was in strict alliance, and a little before Charles compelled Augustus to abdicate the throne of Poland, and his subjects to elect Stanislaus in his stead. The Czar sent Patkul, with the title of his ambassador, into Saxony, to prevail with Augustus to meet him at Grodno, that they might confer on the state of their affairs. This conference took place; and immediately afterwards the Czar went from Grodno to quell a rebellion in Astracan. As soon as the Czar was gone, Augustus, to the surprise of all Europe, ordered Patkul, who was then at Dresden, to be seized as a state criminal. By this injurious and unprecedented action, Augustus at once violated the law of nations, and weakened his own interest; for Patkul was not only an ambassador, but an ambassador from the only power that could afford him protection. The cause, however, was this: Patkul had discovered that Augustus's ministers were to propose a peace to Charles upon any terms; and had therefore formed a design to be beforehand with them, and procure a separate peace between Charles and his new master the Czar. The design of Patkul was discovered; and, to prevent its success, Augustus ventured to seize his person, assuring the Czar that he was a traitor, and had betrayed them both.

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Patkul. Augustus was soon after reduced to beg a peace of Charles at any rate; and Charles granted it upon certain conditions, one of which was, that he should deliver up Patkul. This condition reduced Augustus to a very distressful dilemma: the Czar, at this very time, reclaimed Patkul as his ambassador; and Charles demanded, with threats, that he should be put into his hands. Augustus therefore contrived an expedient by which he hoped to satisfy both: he sent some guards to deliver Patkul, who was prisoner in the castle of Konigstein, to the Swedish troops; but by secret orders, privately dispatched, he commanded the governor to let him escape. The governor, though he received this order in time, yet disappointed its intention by his villainy and his avarice. He knew Patkul to be very rich; and having it now in his power to suffer him to escape with impunity, he demanded of Patkul a large sum for the favour: Patkul refused to buy that liberty which he made no doubt would be gratuitously restored, in consequence of the Czar's requisition and remonstrance; and, in the mean time, the Swedish guards arrived with the order for his being delivered up to them. By this party he was first carried to Charles's head quarters at Albranstadt, where he continued three months, bound to a stake with a heavy chain of iron. He was then conducted to Casimir, where Charles ordered him to be tried; and he was by his judges found guilty. His sentence depended upon the king; and after having been kept a prisoner some months, under a guard of Mayerfeldt's regiment, uncertain of his fate, he was, on the 8th of September 1707, towards the evening, delivered into the custody of a regiment of dragoons, commanded by Colonel Nicholas Hielm. On the next day, the 29th, the colonel took the chaplain of his regiment aside, and telling him that Patkul was to die the next day, ordered him to acquaint him with his fate, and prepare him for it. About this very time he was to have been married to a Saxon lady of great quality, virtue, and beauty, a circumstance which renders his case still more affecting. What followed in consequence of the colonel's order to the minister (A) will be related in his own words.

"Immediately after evening service I went to his prison, where I found him lying on his bed. The first compliments over, I entered upon the melancholy duty of my profession, and turning to the officer who had him in charge, told him the colonel's orders were, that I should be alone with his prisoner. The officer having withdrawn, Patkul grasping both my hands in his, cried out with most affecting anxiety and distress, My dear pastor! what are you to declare? what am I to hear? I bring you, replied I, the same tidings that the prophet brought to king Hezekiah, *Set your house in order, for thou shalt die.* To morrow by this time thou shalt be no longer in the number of the living! At this terrible warning he bowed himself upon his bed, and burst into tears. I attempted to comfort him, by saying that he must, without all doubt, have often meditated on this subject: Yes, cried he, I know, alas! too well, that we must die; but the death prepared for me will be cruel and insupportable. I assured him that the manner of his

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death

(A) The name of this clergyman was Lorens Hagar.

Patkul. death was to me totally unknown; but, believing that he would be prepared for it, I was sure his soul would be received into the number of happy spirits. Here he rose up, and folding his hands together, Marcel! I bid! let me then die the death of the righteous! A little later, with his face inclined to the wall, and his hands joined, he broke out into this soliloquy: *August! O August!* what must be thy lot one day! Must thou not answer for all the crimes thou hast committed? He then observed that he was driven out from his country, by a sentence against his life, pronounced for doing what the king himself encouraged him to do, saving to him one day in terms of much kindness, 'Patkul, maintain the rights of your country like a man of honour, and with all the spirit you are capable of.' That flying into an enemy's country was also unavoidable, as the country of an ally would not have afforded him protection; but that he was in Sweden a wretched exile, not a counsellor or adviser; that before his arrival every thing was already settled, the alliance with Muscovy signed, and the measures with Denmark agreed upon. 'My inclination (said he, after a pause) were always to serve Sweden, though the contrary opinion has prevailed. The elector of Brandenburg owed his title of *king of Prussia* to the services I did him; and when, in recompense, he would have given me a considerable sum of money, I thanked him, and rejected the offer; adding, that the reward I most wished for was to regain the king of Sweden's favour by his intercession. This he promised, and tried every possible method to succeed, but without success. After this I laboured so much for the interest of the late emperor in his Spanish affairs, that I brought about what scarce any other man could have effected. The emperor as an acknowledgment gave me an assignment for 50,000 crowns, which I humbly laid at his feet, and only implored his imperial majesty's recommendation of me to my king's favour: this request he immediately granted, and gave his orders accordingly, but in vain. Yet, not to lose any opportunity, I went to Moscow while the Swedish ambassadors were at that court; but even the mediation of the Czar had no effect. After that I distributed among the Swedish prisoners at Moscow at least 100,000 crowns, to show the ardent desire I had, by all ways, to regain the favour of their sovereign. Would to heaven I had been equally in earnest to obtain the grace of God.'—At these words another shower of tears fell from his eyes, and he remained for some moments silent, and overwhelmed with grief. I used my best endeavours to comfort him with the assurance that this grace would not be denied him, provided he spent the few hours still left in earnestly imploring it; for the door of heaven's mercy was never shut, though that of men might be cruelly so. 'This (replied he), this is my consolation; for thou art God and not man to be angry for ever.' He then inveighed bitterly against Augustus, and reproached himself for having any connection with a wretch who was wholly destitute of all faith and honour, an atheist, without piety, and without virtue. 'While he was at Warsaw (said he), and heard the king was advancing to attack him, he found himself extremely distressed. He was absolutely without money, and therefore obliged to dismiss some of his troops. He had recourse to my

assistance, and intreated me, for the love of God, to borrow whatever sum I could. I procured him 400,000 crowns; 50,000 of which, the very next day, he squandered on trinkets and jewels, which he gave in presents to some of his women. I told him plainly my thoughts of the matter; and by my importunity prevailed, that the Jews should take back their toys, and return the money they had been paid for them. The ladies were enraged; and he swore that I should one time or other suffer for what I had done: there indeed he kept his word; would I to God he had always done so with those he employed!' I now left him for a short time, and at seven in the evening I returned; and the officer being retired, he accosted me with a smiling air, and an appearance of much tranquillity, 'Welcome, dear sir, the weight that lay heavy on my heart is removed, and I already feel a sensible change wrought in my mind. I am ready to die: death is more eligible than the solitude of a long imprisonment. Would to heaven only that the kind of it were less cruel. Can you, my dear sir, inform me in what manner I am to suffer? I answered, that it had not been communicated to me; but that I imagined it would pass over without noise, as only the colonel and myself had notice of it. 'That (replied he) I esteem as a favour; but have you seen the sentence? or must I die, without being either heard or condemned? My apprehensions are of being put to intolerable tortures.' I comforted him in the kindest manner I could; but he was his own best comforter from the Word of God, with which he was particularly acquainted; quoting, among many other passages, the following in Greek, *We must enter into the kingdom of heaven through many tribulations.* He then called for pen and ink, and intreated me to write down what he should dictate. I did so, as follows:

'*Testamentum, or my last will as to the disposition of my effects after my death.*—I. His majesty King Augustus, having first examined his conscience thoroughly, will be so just as to pay back to my relations the sum he owes me; which, being liquidated, will amount to 50,000 crowns; and as my relations are here in the service of Sweden, that monarch will probably obtain it for them.'

"At this he said, let us stop here a little; I will quickly return to finish this will; but now let us address ourselves to God by prayer. Prayers being ended, 'Now (cried he) I find myself yet better, yet in a quieter frame of mind: Oh! were my death less dreadful, with what pleasure would I expiate my guilt by embracing it!—Yes (cried he, after a pause), I have friends in different places, who will weep over my deplorable fate. What will the mother of the king of Prussia say? What will be the grief of the Countess Leveide who attends on her? But what thoughts must arise in the bosom of *her* to whom my faith is plighted? Unhappy woman! the news of my death will be fatal to her peace of mind. My dear pastor, may I venture to beg one favour of you?' I assured him he might command every service in my power. 'Have the goodness then (said he, pressing my hand), the moment I am no more, to write—Alas! how will you set about it? a letter to Madam Einsfeldern, the lady I am promised to—Let her know that I die her's; inform her fully of my unhappy fate! Send her my last

Patkul,

Patkul. left and eternal farewell! My death is in truth disgraceful; but my manner of meeting it will, I hope, by heaven's and your assistance, render it holy and blessed. This news will be her only consolation. A little farther, dear Sir, that I thanked her with my latest breath for the sincere affection she bore me: May she live long and happy: 'This is my dying wish.'—I gave him my hand in promise that I would faithfully perform all he desired.

"Afterwards he took up a book: 'This (said he) is of my own writing. Keep it in remembrance of me, and as a proof of my true regard for religion. I trust it will, it might have the good fortune to be presented to the king, that he may be convinced with what foundation I have been accused of atheism.' Taking it from his hand, I assured him that my colonel would be glad to present it as soon as opportunity offered.

"The rest of his time was employed in prayer, which he went through with a very fervent devotion. On the 9th of September I was again with him at four in the morning. The moment he heard me he arose, and, not once thanks to God, assured me he had not slept for nearly for a long time. We went to prayers; and in truth his pious and devout frame of mind were worthy of admiration. About six he said he would begin his confession, before the din and clamour of the people without could rise to disturb his thoughts. He then knelt down, and went through his confession in a manner truly edifying. The sun beginning to appear above the horizon, he looked out of the window, saying, *Submissa dies!* 'This is my wedding-day. I looked, alas! for another, but this is the happier; for to-day shall my soul be introduced by her heavenly bridegroom into the assembly of the blessed!' He then asked me, whether I yet knew in what way he was to die? I answered, that I did not. He conjured me, by the sacred name of Jesus, not to forsake him; for that he should find in my company some consolation even in the midst of tortures. Casting his eye on the paper that lay on the table, 'This will (said he) can never be finished.' I asked him, whether he would put his name to what was already written? 'No (replied he, with a deep sigh), I will write that hated name no more. My relations will find their account in another place; salute them from me.' He then addressed himself again to God in prayer, and continued his devotions till the lieutenant entered to conduct him to the coach. He wrapped himself up in his cloak, and went forward a great pace, guarded by 100 horsemen. Being arrived at the place of execution, we found it surrounded by 300 foot soldiers; but at the sight of the blocks and wheels, his horror is not to be described. Clasp me in his arms, 'Beg of God (he exclaimed) that my soul may not be thrown into despair amidst these tortures! I comforted, I adjured him, to fix his thoughts on the death of Jesus Christ, who for our sins was nailed to a cross.

"Being now on the spot where he was to suffer, he bid the executioner to do his duty well, and put into his hands some money which he got ready for that purpose. He then stretched himself out upon the wheel; and while they were stripping him naked, he begged me to pray that God would have mercy on him, and bear up his soul in agony. I did so; and turning to all the spectators, said to them, Brethren,

join with me in prayer for this unhappy man. 'Yes (cried he), assist me all of you with your supplications to heaven.' Here the executioner gave him the first stroke. His cries were terrible: 'O Jesus! Jesus! have mercy upon me.' This cruel scene was much lengthened out, and of the utmost horror; for as the headman had no skill in his business, the unhappy victim received upwards of 15 several blows, with each of which were intermixed the most piteous groans and invocations of the name of God. At length, after two strokes given on the breast, his strength and voice failed him. In a faltering dying tone, he was just about to say, 'Cut off my head!' and the executioner, still lingering, he himself placed his head on the block. After four strokes with an hatchet, the head was separated from the body, and the body quartered. Such was the end of the renowned Patkul."

Charles XII. has been very generally and severely censured for not pardoning him, and we are not inclined to vindicate the sovereign. Yet it must be remembered, that Patkul was guilty of a much greater crime than that which drew upon him the displeasure of Charles XI. He invited foreign powers to attack his country when under the government of a boy, hoping, as he said himself, that it would in such circumstances become an easy conquest. He was therefore a rebel of the worst kind; and where is the old date monarch that is ready to pardon such unnatural rebellion? Let it be remembered, too, that Charles, among whose faults no other instance of cruelty has been numbered, certainly thought that, in ordering the execution of Patkul, he was discharging his duty. That monarch, it is known, believed in the possibility of discovering the philosopher's stone. Patkul, when under sentence of death, contrived to impose so far upon the senate at Stockholm, as to persuade them that he had, in their presence, converted into gold a quantity of base metal. An account of this experiment was transmitted to the king, accompanied with a petition to his majesty for the life of so valuable a subject; but Charles, blending magnanimity with his severity, replied with indignation, that he would not grant to interest what he had refused to the calls of humanity and the intreaties of friendship.

PATMOS (anc. geog.), one of the Sporades (Dionysius); 30 miles in compass (Pliny); concerning which we read very little in authors. It was rendered famous by the exile of St John and the Revelation showed him there. The greatest part of interpreters think that St John wrote them in the same place during the two years of his exile; but others think that he did not commit them to writing till after his return to Ephesus. The island of Patmos is between the island of Icaria and the promontory of Miletus. Nothing has long been more honourable than to have been the place of the banishment of St John. It is now called *Patmos*, or *Patinos*, or *Pameli*, or *Palmira*. Its circuit is five and twenty or thirty miles. It has a city called *Patmos*, with a harbour, and some monasteries of Greek monks. It is at present in the hands of the Turks. It is considerable for its harbours; but the inhabitants derive little benefit from them, because the corsairs have obliged them to quit the town and retire to a hill on which St John's convent stands. This convent is a citadel consisting of several irregular towers, and is a

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substantial building seated on a very steep rock. The whole island is very barren, and without wood; however, it abounds with partridges, rabbits, quails, turtles, pigeons, and snipes. All their corn does not amount to 1000 barrels in a year. In the whole island there are scarce 300 men: but there are above 20 women to one man, who expect that all strangers who land in the island should carry some of them away. To the memory of St John is an hermitage on the side of a mountain, where there is a chapel not above eight paces long and five broad. Over head they show a cleft in the rock, through which they pretend that the Holy Ghost dictated to St John. E. Long. 26. 84. N. Lat. 37. 24.

PATNA, a town of Asia, in the dominions of the Great Mogul, to the north of the kingdom of Bengal, where the English have factories for saltpetre, borax, and raw silk. It is the capital of the province of Bahar, a dependency of Bengal, in the empire of Indostan, situated in a pleasant country, 400 miles east of Agra. It extends seven miles in length on the banks of the Ganges, and is about half a mile in breadth.—Mr Rennel gives strong reasons for supposing it to be the ancient **PALIBOTHA**. The town is large and populous, but the houses are built at a distance from each other. E. Long. 85. 40. N. Lat. 45. 25.

PATOMACK, a large river of North America, in Virginia, which rises in the Alleghany mountains, separates Virginia from Maryland, and falls into Chesapeake bay. It is about seven miles broad, and is navigable for near 200 miles.

PATONCE, in heraldry, is a cross, stony at the ends; from which it differs only in this, that the ends, instead of turning down like a fleur-de-lis, are extended somewhat in the pattee form. See **FLOREY**.

PATRÆ, a city of Achaia. This place was visited by Dr Chandler, who gives the following account of it. "It has been often attacked by enemies, taken, and pillaged. It is a considerable town, at a distance from the sea, situated on the side of a hill, which has its summit crowned with a ruinous castle. This made a brave defence in 1447 against Sultan Morat, and held out until the peace was concluded, which first rendered the Morea tributary to the Turks. A dry flat before it was once the port, which has been choked with mud. It has now, as in the time of Strabo, only an indifferent road for vessels. The house of Nicholas Paul, Esq; the English consul, stood on part of the wall either of the theatre or the odæum. By a fountain was a fragment of a Latin inscription. We saw also a large marble bust much defaced; and the French consul showed us a collection of medals. We found nothing remarkable in the citadel. It is a place of some trade, and is inhabited by Jews as well as by Turks and Greeks. The latter have several churches. One is dedicated to St Andrew the apostle, who suffered martyrdom there, and is of great sanctity. It had been recently repaired. The site by the sea is supposed that of the temple of Ceres. By it is a fountain. The air is brd, and the country round about over-run with the low shrub called *glycyrrhiza* or liquorice."

Of its ancient state, the same author speaks thus: "Patræ assisted the Ætolians when invaded by the Gauls under Brennus; but afterwards was unfortu-

nate, reduced to extreme poverty, and almost abandoned. Augustus Cæsar reunited the scattered citizens, and made it a Roman colony, settling a portion of the troops which obtained the victory of Actium, with other inhabitants from the adjacent places. Patræ flourished and enjoyed dominion over Naupactus, Cenchæa, and several cities of Achaia. In the time of Pausanias, Patræ was adorned with temples and porticoes, a theatre, and an odæum which was superior to any in Greece but that of Atticus Herodes at Athens. In the lower part of the city was a temple of Bacchus Ælymnetes, in which was an image preserved in a chest, and conveyed, it was said, from Troy by Eury-pylus; who, on opening it, became disordered in his senses. By the port were temples; and by the sea, one of Ceres, with a pleasant grove and a prophetic fountain of unerring veracity in determining the event of any illness. After supplicating the goddess with incense, the sick person appeared, dead or living, in a mirror suspended so as to touch the surface of the water. In the citadel of Patræ was a temple of Diana Laphria, with her statue in the habit of a huntress of ivory and gold, given by Augustus Cæsar when he laid waste Calydon and the cities of Ætolia to people Nicopolis. The Patrenians honoured her with a yearly festival, which is described by Pausanias who was a spectator. They formed a circle round the altar with pieces of green wood, each 16 cubits long, and within heaped dry fuel. The solemnity began with a most magnificent procession, which was closed by the virgin-priestess in a chariot drawn by stags. On the following day, the city and private persons offered at the altar fruits, and birds, and all kinds of victims, wild-boars, stags, deer, young wolves, and beasts full grown; after which the fire was kindled. He relates, that a bear and another animal forced a way through the fence, but were reconducted to the pile. It was not remembered that any wound had ever been received at this ceremony, though the spectacle and sacrifice were as dangerous as savage. The number of women at Patræ was double that of the men. They were employed chiefly in a manufacture of flax which grew in Elis, weaving garments, and attire for the head."

PATRANA, or **PASTRANA**, a town of New Castile in Spain, with the title of a duchy. It is seated between the rivers Tajo and Tajuna, in W. Long. 2. 45. N. Lat. 40. 26.

PATRAS, an ancient and flourishing town of European Turkey, in the Morea, capital of a duchy, with a Greek archbishop's see. It is pretty large and populous; and the Jews, who are one-third part of the inhabitants, have four synagogues. There are several handsome mosques and Greek churches. The Jews carry on a great trade in silk, leather, honey, wax, and cheese. There are cypress trees of a prodigious height, and excellent pomegranates, citrons, and oranges. It has been several times taken and retaken, and it is just now in the hands of the Turks. It is seated in E. Long. 21. 45. N. Lat. 38. 17.

PATRICA, a town of Italy, in the territory of the church, and in the Campagna of Rome, towards the sea-coast, and eight miles east of Ostia. About a mile from this place is a hill called *Monte de Lirvano*, which some have thought to be the ancient Lavinium founded by Æneas.

Patraz
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Patrica.

PATRES CONSCRIPTI. See CONSCRIPT and SENATOR.

PATRIARCH, PATRIARCHA, one of those first fathers who lived towards the beginning of the world, and who became famous by their long lines of descendants. Abraham, Isaac, and Jacob, and his twelve sons, are the patriarchs of the Old Testament; Seth, Enoch, &c. were antediluvian patriarchs.

The authority of patriarchal government existed in the fathers of families, and their first-born after them, exercising all kinds of ecclesiastical and civil authority in their respective households; and to this government, which lasted till the time of the Israelites dwelling in Egypt, some have ascribed an absolute and despotic power, extending even to the punishment by death. In proof of this, is produced the curse pronounced by Noah upon Canaan (Gen. ix. 25.); but it must be observed, that in this affair Noah seems to have acted rather as a prophet than a patriarch. Another instance of supposed despotic power is Abraham's turning Hagar and Ishmael out of his family (Gen. xxi. 9, &c.); but this can hardly be thought to furnish evidence of any singular authority vested in the patriarchs, as such, and peculiar to those ages. The third instance brought forward to the same purpose is that of Jacob's denouncing a curse upon Simeon and Levi (Gen. xlix. 7.), which is maintained by others to be an instance of prophetic inspiration more than of patriarchal power. The fourth instance is that of Judah with regard to Tamar (Gen. xxxviii. 24.); with regard to which it is remarked, that Jacob, the father of Judah, was still living; that Tamar was not one of his own family; and that she had been guilty of adultery, the punishment of which was death by burning; and that Judah on this occasion might speak only as a prosecutor.

On the whole, however, it is difficult to say which of these opinions are most agreeable to truth. Men who believe the origin of civil government, and the obligation to obedience, to arise from a supposed original contract, either real or implied, will be naturally led to weaken the authority of the patriarchs: and those again who esteem government to be a divine institution, will be as apt to raise that authority to the highest pitch that either reason or scripture will permit them. It cannot be denied, that authority existed in fathers, and descended to their first-born, in the first ages of the world; and it is neither unnatural nor improbable to imagine, that the idea of hereditary power and hereditary honours was first taken from this circumstance. But whether authority has descended through father and son in this way to our times, is a circumstance that cannot in one instance be asserted, and can be denied in a thousand. The real source of the dignity and of the authority of modern times seems to have been, skill in the art of war, and success in the conduct of conquests.

Jewish **PATRIARCH,** a dignity, respecting the origin of which there are a variety of opinions. The learned authors of the Universal History think, that the first appearance and institution of those patriarchs happened under Nerva the successor of Domitian. It seems pro-

table that the patriarchs were of the Aaronic or Levitical race; the tribe of Judah being at that time too much depressed, and too obnoxious to the Romans to be able to assume any external power. But of whatever tribe they were, their authority came to be very considerable. Their principal business was to instruct the people; and for this purpose they instituted schools in several cities. And having gained great reputation for their extraordinary learning, zeal, and piety, they might, in time, not only bring a great concourse of other Jews from other parts, as from Egypt and other western provinces of their dispersion, but likewise prove the means of their patriarchal authority's being acknowledged there. From them they ventured at length to levy a kind of tribute, in order to defray the charges of their dignity, and of the officers (A) under them, whose business it was to carry their orders and decisions through the other provinces of their dispersion, and to see them punctually executed by all, that some shadow of union at least might be kept up among the western Jews. They likewise nominated the doctors who were to preside over their schools and academies; and these were in process of time styled *chiefs* and *princes*, in order to raise the credit of that dignity, or to imply the great regard which their disciples were to pay to them. These chiefs became at length rivals of the patriarchs; and some of them possessed both dignities at once; an usurpation which caused not only great confusion amongst them, but oftentimes very violent and bloody contests. However, as the Jewish Rabbies have trumped up a much older era for this patriarchal dignity, and have given us a succession of them down to the fifth century, in which it was abolished, it will not be amiss to give our readers the substance of what they have written of the rise and progress of this order of men; and at the same time to show them the absurdity and falsehood of that pretended succession to this imaginary dignity.

According to them, the first patriarch was Hillel, surnamed the *Babylonian*, because he was sent for from thence to Jerusalem about 100 years before the ruin of their capital, or 30 years before the birth of Christ, to decide a dispute about the keeping of Easter, which on that year fell out on the Sabbath-day; and it was on account of his wife's decision that he was raised to that dignity, which continued in his family till the said fifth century. He was likewise looked upon as a second Moses, because he lived like him 40 years in obscurity, 40 more in great reputation for learning and sanctity, and 40 more in possession of this patriarchal dignity. They make him little inferior to that lawgiver in other of his excellencies, as well as in the great authority he gained over the whole Jewish nation. The wonder will be, how Herod the Great, who was so jealous of his own power, could suffer a stranger to be raised to such a height of it, barely for having decided a dispute which must in all likelihood have been adjudged by others long before that time.

However, Hillel was succeeded by his son Simeon, whom many Christians pretend to have been the venerable old person of that name, who received the Divine infant in his arms. The Jews give him but a very

(A) These were called *Apostoli* or *Legatis*.

Patriarch. very obscure patriarchate; though the authors above quoted make him, more very, chief of the sanhedrim; and Epiphanius says, that the priests till he hated him so much for giving so ample a testimony to the divine child, that they denied him common burial. But it is hardly credible that St. Luke should have so carelessly passed over his two-fold dignity, if he had been really possessed of them, and have given him no higher title than that of a just and devout man.

He was succeeded by Joshua, not in right of descent, but of his extraordinary merit, which the Rabbies, according to an *Origen*, have raised to so surprising a height, that, according to them, if the whole heavens were paper, all the trees in the world pens, and all the men writers, they would not suffice to pen down all his lessons. He enjoyed his dignity but two years, according to some, or five according to others: and was the person who, of opening the gates of the temple to open of their own accord, cried out, "O temple, temple! why art thou thus moved! We know that thou art to be destroyed, seeing Zechariah hath foretold it, saying, 'Open thy gates. O Lebanon, and let the flames consume thy cedars.'" Upon this he is further reported to have complimented Vespasian, or rather, as some have corrected the story, Titus, with the title of *king*, assuring him that it was a royal person who was to destroy that edifice; on which account they pretend that general gave him leave to remove the sanhedrim to Japhne.

The Jewish writers add, that he likewise erected an academy there, which subsisted till the death of Akiba; and was likewise the seat of the patriarch; and consisted of 300 schools, or classes of scholars. Another he erected at Lydda, not far from Japhne, and where the Christians have buried their famed St. George. He lived 120 years, and being asked, what he had done to prolong his life? he gave this wise answer; I never made water nearer a house of prayer than four cubits: I never disguised my name: I have taken care to celebrate all festivals: and my mother hath even sold my head ornaments to buy wine enough to make me merry on such days; and left me at her death 300 hogheads of it, to sanctify the Sabbath.—The doctors that flourished in his time were no less considerable, both for their number and character; particularly the famed Rabbi Chanina, of whom the Bath Col was heard to say, that the world was preserved for the sake of him; and R. Nicodemus, whom they pretend to have stopped the course of the sun, like another Joshua.

He was succeeded by Gamaliel, a man, according to them, of unsufferable pride; and yet of so universal authority over all the Jews, not only in the west, but over the whole world, that the very monarchs suffered his laws to be obeyed in their dominions, not one of them offering to obstruct the execution of them. In his days flourished Samuel the Less, who composed a prayer full of the bitterest curses against heretics, by which they mean the Christians; and which are still in use to this day. Gamaliel was no less an enemy to them; and yet both have been challenged, the former as the celebrated master of our great apostle, the latter as his disciple in his unconverted state.

Simeon II. his son and successor, was the first martyr who died during the siege of Jerusalem. The

Patriarch people so regretted his death, that an order was given, instead of 10 bumpers of wine, which were usually drunk at the funeral of a saint, to drink 13 at his, on account of his martyrdom. These bumpers were at time multiplied, they tell us, to such shameful height, that the sanhedrim was forced to make some new regulations to prevent that abuse.

These are the patriarchs which, the Rabbies tell us, preceded the destruction of the temple; and we need no farther confutation of this pretended dignity, than the silence of the sacred historians, who not only make not the least mention of it, but assure us all along that they were the high-priests who presided in the sanhedrim; and before whom all cases relating to the Jewish religion were brought and decided. It was the high-priest who examined and condemned our Saviour: that condemned St. Stephen; that forbade the apostles to preach in Christ's name; and who sat as judge on the great apostle at the head of that supreme court. The same may be urged from Josephus, who must needs have known and mentioned this pretended dignity, if any such there had been; and yet is so far from taking the least notice of it, that, like the evangelists, he places the pontiffs alone at the head of all the Jewish affairs; and names the high-priest Ananus as having the care and direction of the war against the Romans;—which is an evident proof that there were then no such patriarchs in being.

To all this let us add, that if there had been any such remarkable succession, the Talmudists would have preserved it to future ages; whereas, neither they, nor any of the ancient authors of the Jewish church, make any mention of it; but only some of their doctors, who have written a considerable time after them, as of writers to whom little credit can be given in points of this nature; especially as there are such unmountable contradictions between them, as no authors either Jewish or Christian have, with all their pains, been hitherto able to reconcile.

Their succession, according to the generality of those rabbies stands as follows:

1. Hillel the Babylonian. 2. Simeon the son of Hillel. 3. Gamaliel the son of Simeon. 4. Simeon II. the son of Gamaliel. 5. Gamaliel II. the son of Simeon II. 6. Simeon III. the son of Gamaliel II. 7. Judah the son of Simeon III. 8. Gamaliel III. the son of Judah. 9. Judah II. the son of Gamaliel III. 10. Hillel II. son of Judah II. 11. Judah III. son of Hillel II. 12. Hillel III. son of Judah III. 13. Gamaliel IV. son of Hillel III.

According to Gantz Tzemach David, who hath reduced them to 10, they are,

1. Hillel the Babylonian. 2. Simeon the son of Hillel. 3. Rabb Gamaliel Rebbona. 4. R. Simeon the son of Gamaliel. 5. Rabban Gamaliel his son. 6. R. Jehudah the prince. 7. Hillel the prince, his son. 8. Rabban Gamaliel the Old. 9. Simeon III. 10. R. Judah, Nassi or prince.

On the whole, it cannot be doubted but that their first rise was in Nerva's time, however much Jewish pride may have prompted them to ascribe, and to assert their origin to have been more ancient than it really was. Nor have the Jews been faithful in giving an account of the authority of these men. They have exaggerated their power beyond all bounds, for the purpose of repelling

patriarchs. repelling the arguments of Christians: for their power was certainly more showy than substantial. In time, however, they certainly imposed upon the people; and what power they did possess (which the Romans only allowed to be in religious matters, or in such as were connected with religion) they exercised with great rigour. Their pecuniary demands, in particular, became very exorbitant; and was the cause of their suppression in the year 429.

PATRIARCHS, among Christians, are ecclesiastical dignitaries, or bishops, so called from their paternal authority in the church. The power of patriarchs was not the same in all, but differed according to the different customs of countries, or the pleasures of kings and councils. Thus the patriarch of Constantinople grew to be a patriarch over the patriarchs of Ephesus and Cæsarea, and was called the *æcumenical and universal patriarch*; and the patriarch of Alexandria had some prerogatives which no other patriarch but himself enjoyed, such as the right of consecrating and approving every single bishop under his jurisdiction.

The patriarchate has been ever esteemed the supreme dignity in the church: the bishop had only under him the territory of the city of which he was bishop; the metropolitan superintended a province, and had for suffragans the bishops of his province; the primate was the chief of what was then called a *diocese* (A), and had several metropolitans under him; and the patriarch had under him several dioceses, composing one exarchate, and the primates themselves were under him.

Usher, Pagi, De Marca, and Morinus, attribute the establishment of the grand patriarchates to the apostles themselves; who, in their opinion, according to the description of the world then given by geographers, pitched on the three principal cities in the three parts of the known world; viz. Rome in Europe, Antioch in Asia, and Alexandria in Africa: and thus formed a trinity of patriarchs. Others maintain that the name patriarch was unknown at the time of the council of Nice; and that for a long time afterwards patriarchs and primates were confounded together, as being all equally chiefs of dioceses, and equally superior to metropolitans, who were only chiefs of provinces. Hence Socrates gives the title patriarch to all the chiefs of dioceses, and reckons ten of them. Indeed, it does

not appear that the dignity of patriarch was appropriated to the five grand sees of Rome, Constantinople, Alexandria, Antioch, and Jerusalem, till after the council of Chalcedon in 451; for when the council of Nice regulated the limits and prerogatives of the three patriarchs of Rome, Antioch, and Alexandria, it did not give them the title of patriarchs, though it allowed them the pre-eminence and privileges thereof; thus when the council of Constantinople adjudged the second place to the bishop of Constantinople, who till then was only a suffragan of Heraclea, it said nothing of the patriarchate. Nor is the term *patriarch* found in the decree of the council of Chalcedon, whereby the fifth place is assigned to the bishop of Jerusalem; nor did these five patriarchs govern all the churches.

There were besides many independent chiefs of dioceses, who, far from owning the jurisdiction of the grand patriarchs, called themselves *patriarchs*; such as that of Aquileia; nor was Carthage ever subject to the patriarch of Alexandria. Mosheim * imagines that the bishops, who enjoyed a certain degree of pre-eminence over the rest of their order, were distinguished by the Jewish title of patriarchs in the fourth century. The authority of the patriarchs gradually increased, till, about the close of the fifth century, all affairs of moment within the compass of their patriarchate came before them, either at first hand or by appeals from the metropolitans. They consecrated bishops; assembled yearly in council the clergy of their respective districts; pronounced a decisive judgment in those cases where accusations were brought against bishops; and appointed vicars or deputies, clothed with their authority, for the preservation of order and tranquillity in the remoter provinces. In short, nothing was done without consulting them; and their decrees were executed with the same regularity and respect as those of the princes.

It deserves to be remarked, however, that the authority of the patriarchs was not acknowledged through all the provinces without exception. Several districts, both in the eastern and western empires, were exempted from their jurisdiction. The Latin church had no patriarchs till the sixth century; and the churches of Gaul, Britain, &c. were never subject to the authority of the patriarch of Rome, whose authority only extended to the suburbicary provinces. There was no primacy, no exarchate

Patriarchs.

* Eccl. Hist. vol. 5. p. 284.

(A) The word diocese was then of very different import from what it bears now. Under the article **EPISCOPACY**, it was observed, that the first founders of churches regulated their extent and the jurisdiction of their bishops by the divisions of the Roman empire into civil jurisdictions. One of these divisions was into provinces and dioceses. A province comprised the cities of a whole region subjected to the authority of one chief magistrate, who resided in the metropolis or chief city of the province. A diocese was a still larger district, comprehending within it several provinces, subject to the controul of a chief magistrate, whose residence was in the metropolis of the diocese. The jurisdiction of the bishops of the Christian church was established upon this model. The authority of a private bishop extended only over the city in which he resided, together with the adjacent villages and surrounding tract of country. This district was called *parochia*, though it comprehended many parishes in the modern sense of that word. Under Arcadius and Honorius the empire was divided into thirteen dioceses: 1. The Oriental diocese, containing fifteen provinces; 2. The diocese of Egypt, six provinces; 3. The Asiatic diocese, ten provinces; 4. The Pontic diocese, ten provinces; 5. The diocese of Thrace, six provinces; 6. The diocese of Macedonia, six provinces; 7. The diocese of Decia, five provinces; 8. The Italic diocese, seventeen provinces; 9. The diocese of Illyricum, six provinces; 10. The diocese of Africa, six provinces; 11. The Spanish diocese, seven provinces; 12. The Gallican diocese, seventeen provinces; 13. The Britannie diocese, five provinces. Each of these provinces comprehended many *parochie*, and each *parochia* many modern parishes. See Bingham's *Origines Sacrae*, Book ix.

Patriarchal
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Patrick

archate nor patriarchate, owned here; but the bishops, with the metropolitans, governed the church in common. Indeed, after the name patriarch became frequent in the west, it was attributed to the bishops of Bourges and Lyons; but it was only in the first signification, viz. as heads of dioceses. Du Cange says, that there have been some abbots who have borne the title of patriarchs.

PATRIARCHAL CROSS, in heraldry, is that where the shaft is twice crossed; the lower arms being longer than the upper ones.

PATRICIAN, a title given, among the ancient Romans, to the descendants of the hundred, or, as some will have it, of the two hundred first senators chosen by Romulus; and by him called *pateres*, "fathers." Romulus established this order after the example of the Athenians; who were divided into two classes, viz. the *patricii* *patricios*, and *plebei* *populares*. Patricians, therefore, were originally the nobility; in opposition to the plebeians. They were the only persons whom Romulus allowed to aspire to the magistracy; and they exercised all the functions of the priesthood till the year of Rome 495. But the cognizance and character of these ancient families being almost lost and extinguished by a long course of years, and frequent changes in the empire, a new kind of patricians were afterwards set on foot, who had no pretensions from birth, but whose title depended entirely on the emperor's favour. This new patriciate, Zoizmus tells us, was erected by Constantine, who conferred the quality on his counsellors, not because they were descended from the ancient fathers of the senate, but because they were the fathers of the republic or of the empire. This dignity in time became the highest of the empire. Justinian calls it *summam dignitatem*. In effect, the patricians seem to have had the precedence of the *consulares*, and to have taken place before them in the senate; though F. Faber asserts the contrary. What confounds the question is, that the two dignities often met in the same person; because the patriciate was only conferred on those who had gone through the first offices of the empire, or had been consuls. Pope Adrian made Charlemagne take the title of patrician before he assumed the quality of emperor; and other popes have given the title to other kings and princes by reason of its eminence.

PATRICIAN is also a title of honour often conferred on men of the first quality in the time of our Anglo-Saxon kings. See **THANE**.

PATRICIAN Deities, *Patricii Dei*, in mythology, were Janus, Saturn, the Genius, Pluto, Bacchus, the Sun, the Moon, and the Earth.

PATRICIANS, in ecclesiastical writers, were ancient heretics, who disturbed the peace of the church in the beginning of the third century: thus called from their founder *Patricius*, preceptor of a Marcionite called *Sempronius*. His distinguishing tenet was, that the substance of the flesh is not the work of God, but that of the devil: on which account his adherents bore an implacable hatred to their own flesh; which sometimes carried them so far as to kill themselves. They were also called **TATIANITES**, and made a branch of the **ENCRATITÆ**.

PATRICK (St), the apostle of Ireland, and second bishop of that country. He was born April 20. A. D. 373, of a good family, at Kirk Patrick near

Dumbarton, in what is now called Scotland, but then comprehended under the general name of Britain — His baptismal name *Succath*, signifies, in the British language, "valiant in war." On some inroad of certain exiles from Ireland he was taken prisoner, and carried into that kingdom, where he continued six years in the service of Milecho, who had bought him of three others, when Patrick acquired the new name of *Cathraig*, or *Cenbar-Tigh*, i. e. *four families*. In this time he made himself master of the Irish language, and at last made his escape, and returned home on board a ship. About two years after, he formed a design of converting the Irish, either in consequence of a dream, or of reflection on what he had observed during his acquaintance with them. The better to qualify himself for this undertaking, he travelled to the continent, where he continued 35 years, pursuing his studies under the direction of his mother's uncle St. Martin, bishop of Tours, who had ordained him deacon; and after his death with St. German, bishop of Auxerre, who ordained him priest, and gave him his third name *Mawm* or *Maginm*.

An ancient author, Henricus Antissiodorensis, who wrote a book concerning the miracles of St. German, considers it as the highest honour of that prelate to have been the instructor of St. Patrick: "As the glory of a father shines in the government of his sons, out of the many disciples in religion who are reported to have been his sons in Christ; suffice it briefly to mention one by far the most famous, as the series of his actions shows, Patrick the particular apostle of Ireland, who being under his holy discipline 18 years, derived no little knowledge in the inspired writings from such a source. The most godly divine pontiff, considering him alike distinguished in religion, eminent for virtue, and steadfast in doctrine; and thinking it absurd to let one of the best labourers remain inactive in the Lord's vineyard, recommended him to Celestine, Pope of Rome, by his presbyter Secretius, who was to carry to the apostolic see a testimonial of ecclesiastical merit of this excellent man. Approved by his judgment, supported by his authority, and confirmed by his blessing, he set out for Ireland; and being peculiarly destined to that people as their apostle, instructed them at that time by his doctrine and miracles; and now does and will forever display the wonderful power of his apostleship." Lastly, Pope Celestine consecrated him bishop, and gave him his most familiar name *Patricius*, expressive of his honourable descent; and to give lustre and weight to the commission which he now charged him with to convert the Irish. Palladius had been here a year before him on the same design, but with little success: the saints Kieran, Ailbe, Declan, and Iarn, were precursors both to Palladius and Patrick. But the great office of apostle of Ireland was reserved for our prelate, who laboured in the country of the Evoiein, or at Wicklow, A. D. 441. His first convert was Sinell, eighth in descent from Cormac king of Leinster; but not meeting with encouragement, he proceeded to Dublin, and thence to Ulster, where he founded a church (afterwards the famous abbey of Saul, in the county of Down), remarkable for its position, being made out of a barn, and its greatest length reaching from north to south. After labouring seven years indefatigably in his great work, he returned

Patric

Patrick. ed to Britain, which he delivered from the heresies of Pelagius and Arius; engaged several eminent persons to assist him; visited the Isle of Man, which he converted in 447, when the bishopric was founded; and, A. D. 448, returned to the see of Armagh (A), which he had founded three years before; and in 13 years more completed the conversion of the whole island (B). After giving an account of his commission at Rome, he once more returned hither, and spent the remainder of his life between the monasteries of Armagh and Saul, superintending and enforcing the great plan of doctrine and discipline which he had established. After having established schools, or an academy here, he closed his life and ministry at Saul ab'ey, in the 120th year of his age, March 17. A. D. 493, and was buried at Down afterwards, in the same grave with St Brigit and St Columb, in the same place. Respecting his burial place, however, there have been great disputes; and it has been as often a subject of debate with the religious, as Homer's birth place was formerly among the cities of Greece. Those of Down lay claim to it, on the authority of the following verses:

These three in Down lie in tomb one,
Brigit, Patrickus, and Columba pious.

Those of Glashenbury in England, from the old monuments of their church: And some Scots affirm him to have been both born and buried among them at Glasgow. His genuine works were collected and printed by Sir James Ware, 1656. His immediate successor in this see was St Binen or Begnus.

Order of St Patrick, an institution which took place in Ireland in the year 1783. On the fifth of February, in that year, the king ordered letters patent to be passed under the great seal of the kingdom of Ireland, for creating a society or brotherhood, to be called *Knights of the illustrious order of St Patrick*, of which his majesty, his heirs, and successors, shall perpetually be sovereigns, and his majesty's lieutenant-general and general-governor of Ireland, &c. for the time being, shall officiate as grand masters; and also for appointing Prince Edward, and several of the prime nobility of Ireland, knights companions of the said illustrious order.

PATRICK (Simon), a very learned English bishop, was born at Gainsborough in Lincolnshire in 1626. In 1644 he was admitted into Queen's college, Cambridge, and entered into holy orders. After being for some time chaplain to Sir Walter St John, and vicar of

the church at Battersea in Surry, he was preferred to the rectory of St Paul's, Covent-garden, in London, where he continued all the time of the plague in 1665; among his parishioners, to their great comfort. In 1668 he published his *Friendly Debate* between a Conformist and a Nonconformist. This was answered by the Dissenters, whom he had much exasperated by it; but by his moderation and candour toward them afterwards, they were perfectly reconciled to him, and he brought over many of them to the communion of the established church. In 1678 he was made dean of Peterborough, where he was much beloved. In 1682, Dr Lewis de Moulin, who had been a history-professor at Oxford, and written many bitter books against the church of England, sent for Dr Patrick upon his sick bed, and made a solemn declaration of his regret on that account, which he signed, and it was published after his death. During the reign of King James, the dean's behaviour showed that he had nothing more at heart than the Protestant religion; for which he ventured all that was dear to him, by preaching and writing against the errors of the church of Rome. In 1687 he published a prayer composed for that difficult time, when persecution was expected by all who stood firm to their religion. The year after the Revolution, the dean was appointed bishop of Chichester, and was employed with others of the new bishops to settle the affairs of the church in Ireland. In 1691 he was translated to the see of Ely, in the room of the deprived bishop Turner. He died in 1717, after having published various works; among which the most distinguished are his *Paraphrases and Commentaries on the Holy Scriptures*, three volumes folio. These, with Lowth on the Proverbs, Arnold on the Apocrypha, and Whitby on the New Testament, make a regular continued commentary in English on all the sacred books.

PATRIMONY, a right or estate inherited by a person from his ancestors.

The term *patrimony* has been also given to church-estates or revenues; in which sense author Hill says the patrimony of the church of Rimini, Milan, &c. The church of Rome hath patrimonies in France, Africa, Sicily, and many other countries. To create the greater respect to the estates belonging to the church, it was usual to give their patrimonies the names of the saints they held in the highest veneration: thus the estate of the church of Ravenna was called the *patrimony of St Apollinaris*; that of Milan, the *patrimony of*

Patrick.
Patrimony.

(A) At Armagh St Patrick founded, A. D. 445 or 447, a priory of Augustine canons, dedicated to St Peter and St Paul, much enriched by the archbishops; restored by Imar O Hedegan in the 12th century. It was granted, A. D. 1611, to Sir Toby Caulfield, knight. St Patrick also founded there a house of canonesses of the same order, under his sister Lupita, called *Templena firta*, or the "house of miracles."

We are told, that Armagh was made a metropolitical see in honour of St Patrick; in consequence of which it was held in the highest veneration not only by bishops and priests, but also by kings and bishops, as the venerable Bede informs us.

(B) There is a cave in the county of Donegal or Tir-connel, near the source of the Liffey, which, it is pretended, was dug by Ulysses, in order to hold conversations with infernals. The present inhabitants call it *Ellan n' Fradatory*, or the "Island of Purgatory, and Patrick's Purgatory." They affirm, with a pious credulity, that St Patrick the apostle of Ireland, or some abbot of that name, obtained of God by his earnest prayers, that the pains and torments which await the wicked after this life might be here set forth to view, in order the more easily to recover the Irish from their sinful state and heathenish errors.

P
of

Patriotism. of *St Ambrose*; and the estates of the Roman church were called the *patrimony of St Peter in Abruzzo*, the *patrimony of St Peter in Sicily*, and the like.

What is now called *St Peter's patrimony* is only the duchy of Castro, and the territory of Orvieto. See CASTRO, &c.

PATRIOTISM, a love of one's country, which is one of the noblest passions that can warm and animate the human breast. It includes all the limited and particular affections to our parents, children, friends, neighbours, fellow-citizens, and countrymen. It ought to direct and limit their more confined and partial actions within their proper and natural bounds, and never let them encroach on those sacred and first regards we owe to the great public to which we belong. Were we solitary creatures, detached from the rest of mankind, and without any capacity of comprehending a public interest, or without affections leading us to desire and pursue it, it would not be our duty to mind it, nor criminal to neglect it. But as we are parts of the public system, and are not only capable of taking in large views of its interests, but by the strongest affections connected with it, and prompted to take a share of its concerns, we are under the most sacred ties to prosecute its security and welfare with the utmost ardour, especially in times of public trial.

"Zeal for the public good (says Mr Addison) is the characteristic of a man of honour and a gentleman. and must take place of pleasures, profits, and all other private gratifications: that whosoever wants this motive, is an open enemy, or an inglorious neuter to mankind, in proportion to the misapplied advantages with which nature and fortune have blessed him." This love of our country does not import an attachment to any particular soil, climate, or spot of earth, where perhaps we first drew our breath, though those natural ideas are often associated with the moral ones; and, like external signs or symbols, help to ascertain and bind them; but it imports an affection to that moral system or community, which is governed by the same laws and magistrates, and whose several parts are variously connected one with the other, and all united upon the bottom of a common interest. Wherever this love of our country prevails in its genuine vigour and extent, it swallows up all fordid and selfish regards; it conquers the love of ease, power, pleasure, and wealth; nay, when the amiable partialities of friendship, gratitude, private affection, or regards to a family, come in competition with it, it will teach us to sacrifice all, in order to maintain the rights, and promote and defend the honour and happiness of our country. To pursue therefore our private interests in subordination to the good of our country; to be examples in it of virtue, and obedient to the laws; to choose such representatives as we apprehend to be the best friends to its constitution and liberties; and if we have the power, to promote such laws as may improve and perfect it; readily to embrace every opportunity for advancing its prosperity; cheerfully to contribute to its defence and support; and, if need be, to die for it:—these are among the duties which every man, who has the happiness to be a member of our free and Protestant constitution, owes to his country.

The constitution of man is such, that the most selfish passions, if kept within their proper bounds, have a tendency to promote the public good. There is

no passion of more general utility than patriotism; but its origin may unquestionably be termed selfish. The love of one's relations and friends is the most natural expansion of self-love: this affection connects itself too with local circumstances, and sometimes cannot easily be separated from them. It often varies, as relationship or place varies; but acquires new power when the whole community becomes its object. It was therefore with singular propriety that the poet said, "Self-love and social are the same." Under the article CALAIS we have already given the outlines of the transactions of its siege by Edward III. during which the inhabitants displayed a degree of patriotism truly wonderful. History scarcely contains a more distinguished instance of true patriotic virtue than on this occasion. We shall therefore give a fuller account of this remarkable affair, as one of the best examples that can possibly be selected of the virtue we have been explaining. The inhabitants, under Count Vienne their gallant governor, made an admirable defence against a well-disciplined and powerful army. Day after day the English effected many attacks, which they repeatedly expected to storm by morning; but, when morning appeared, they wondered to behold new ramparts raised nightly, erected out of the ruins which the day had made. France had now put her sickle into her second harvest since Edward with his victorious army sat down before the town. The eyes of all Europe were intent on the issue. The English made their approaches and attacks without remission; but the citizens were as obstinate in repelling all their efforts. At length, famine did more for Edward than arms. After the citizens had devoured the lean carcases of their half-starved cattle, they tore up old foundations and rubbish in search of vermin: they fed on boiled leather, and the weeds of exhausted gardens; and a morsel of damaged corn was accounted matter of luxury. In this extremity they resolved to attempt the enemy's camp. They boldly sallied forth; the English joined battle; and, after a long and desperate engagement, Count Vienne was taken prisoner; and the citizens, who survived the slaughter, retired within their gates. On the captivity of their governor, the command devolved upon Eustace Saint Pierre, the mayor of the town, a man of mean birth, but of exalted virtue. Eustace soon found himself under the necessity of capitulating, and offered to deliver to Edward the city, with all the possessions and wealth of the inhabitants, provided he permitted them to depart with life and liberty. As Edward had long since expected to ascend the throne of France, he was exasperated to the last degree against these people, whose sole valour had defeated his warmest hopes; he therefore determined to take an exemplary revenge, though he wished to avoid the imputation of cruelty. He answered by Sir Walter Mauny, that they all deserved capital punishment, as obstinate traitors to him, true and notable sovereigns; that, however, in his wonted clemency, he consented to pardon the bulk of the plebeians, provided they would deliver up to him six of their principal citizens with halters about their necks, as victims of due atonement for that spirit of rebellion with which they had inflamed the common people. All the remains of this desolate city were convened in the great square; and like men arraigned at a tribunal from whence there was no appeal, expect-

ed with throbbing hearts the sentence of their conqueror. When Sir Walter had declared his message, consternation and pale dismay was impressed on every face: each looked upon death as his own inevitable lot; for how should they desire to be saved at the price proposed? Whom had they to deliver up, save parents, brothers, kindred, or valiant neighbours, who had so often exposed their lives in their defence? To a long and dead silence, deep sighs and groans succeeded, till Eustace Saint Pierre ascending a little eminence, thus addressed the assembly: "My friends and fellow-citizens, you see the condition to which we are reduced; we must either submit to the terms of our cruel and ensnaring conqueror, or yield up our tender infants, our wives, and chaste daughters, to the bloody and brutal lusts of the violating soldiery. We well know what the tyrant intends by his specious offers of mercy. It does not satiate his vengeance to make us merely miserable, he would also make us criminal: he would make us contemptible; he will grant us life on no condition, save that of our being unworthy of it. Look about you, my friends, and fix your eyes on the person whom you wish to deliver up as the victims of your own safety. Which of these would you appoint to the rack, the ax, or the halter? Is there any here who has not watched for you, who has not fought for you, who has not bled for you? Who, through the length of this inveterate siege, has not suffered fatigues and miseries a thousand times worse than death, that you and yours might survive to days of peace and prosperity? Is it your preservers, then, whom you would define to destruction? You will not, you cannot, do it. Justice, honour, humanity, make such a treason impossible. Where then is our resource? Is there any expedient left, whereby we may avoid guilt and infamy on one hand, or the desolation and horrors of a sacked city on the other? There is, my friends, there is one expedient left; a gracious, an excellent, a god-like expedient! Is there any here to whom virtue is dearer than life! Let him offer himself an oblation for the safety of his people! he shall not fail of a blessed approbation from that power, who offered up his only Son for the salvation of mankind." He spoke—but an universal silence ensued. Each man looked round for the example of that virtue and magnanimity in others, which all wished to approve in themselves, though they wanted the resolution. At length Saint Pierre resumed: "It had been base in me, my fellow-citizens, to promote any matter of damage to others, which I myself had not been willing to undergo in my own person. But I held it ungenerous to deprive any man of that preference and estimation, which might attend a first offer on so signal an occasion: for I doubt not but there are many here as ready, nay, more zealous for this martyrdom than I can be, however modesty and the fear of imputed ostentation may withhold them from being foremost in exhibiting their merits. Indeed the station to which the captivity of Count Vienne has unhappily raised me, imports a right to be the first in giving my life for your sakes. I give it freely, I give it cheerfully. Who comes next? Your son! exclaimed a youth, not yet come to maturity. — Ah, my child! cried St Pierre; I am then twice sacrificed.—But no—I have rather begotten thee a second time.—Thy years are

few, but full, my son; the victim of virtue has reached the utmost purpose and goal of mortality. Who next, my friends? This is the hour of heroes.—Your kinsman, cried John de Aire! Your kinsman, cried James Wissant! Your kinsman, cried Peter Wissant!—"Ah! (exclaimed Sir Walter Mauny, 'bursting into tears), why was I not a citizen of Calais?" The sixth victim was still wanting, but was quickly supplied by lot, from numbers who were now emulous of so ennobling an example. The keys of the city were then delivered to Sir Walter. He took the six prisoners into his custody. He ordered the gates to be opened, and gave charge to his attendants to conduct the remaining citizens with their families through the camp of the English. Before they departed, however, they desired permission to take their last adieu of their deliverers.—What a parting! what a scene! they crowded with their wives and children about St Pierre and his fellow-prisoners. They embraced, they clung around, they fell prostrate before them. They groaned; they wept aloud; and the joint clamour of their mourning passed the gates of the city, and was heard throughout the camp. At length Saint Pierre and his fellow victims appeared under the conduct of Sir Walter and his guard. All the tents of the English were instantly emptied. The soldiers poured from all parts, and arranged themselves on each side to behold, to contemplate, to admire this little band of patriots as they passed. They murmured their applause of that virtue which they could not but revere even in enemies; and they regarded those ropes which they had voluntarily assumed about their necks as ensigns of greater dignity than that of the British Garter. As soon as they had reached the royal presence, "Mauny (says the king), are these the principal inhabitants of Calais?" "They are (says Mauny); they are not only the principal men of Calais, they are the principal men of France, my lord, if virtue has any share in the act of ennobling." "Were they delivered peaceably, (says Edward)? Was there no resistance, no commotion among the people?" "Not in the least, my lord. They are self-delivered, self-devoted, and come to offer up their inestimable heads as an ample equivalent for the ransom of thousands."

The king, who was highly incensed at the length and difficulty of the siege, ordered them to be carried away to immediate execution; nor could all the remonstrances and intreaties of his courtiers divert him from his cruel purpose. But what neither a regard to his own interest and honour, what neither the dictates of justice, nor the feelings of humanity, could effect, was happily accomplished by the more powerful influence of conjugal affection. The queen, who was then big with child, being informed of the particulars respecting the six victims, flew into her husband's presence, threw herself on her knees before him, and, with tears in her eyes, besought him not to stain his character with an indelible mark of infamy, by committing such a horrid and barbarous deed. Edward could refuse nothing to a wife whom he so tenderly loved, and especially in her condition; and the queen, not satisfied with having saved the lives of the six burghers, conducted them to her tent, where she applauded their virtue, regaled them with a plentiful

ful repast, and having made them a present of money and clothes, sent them back to their fellow-citizens.

*Platani's
Hist. of Ly-
curgus.*

The love of their country, and of the public good, seems to have been the predominant passion of the Spartans. Pedarctus having missed the honour of being chosen one of the three hundred who had a certain rank of distinction in the city, went home extremely pleased and satisfied; saying, "He was overjoyed there were three hundred men in Sparta more honourable than himself."

The patriotism of the Romans is well known, and has been justly admired. We shall content ourselves at present with the following example: a zeal and patriotic devotion similar to which is perhaps scarcely equalled, and certainly is not exceeded, in history.

*Dion. lib.
viii. p. 579
and R. H. n.
Rom. Hist.
v. i. p. 306.*

Rome, under the consuls Cæso Fabius and T. Virginus, had several wars to sustain, less dangerous than troublesome, against the Æqui, Volsci, and Veientes. To put a stop to the incursions of the last, it would have been necessary to have established a good garrison upon their frontiers to keep them in awe. But the commonwealth, exhausted of money, and menaced by abundance of other enemies, was not in a condition to provide for so many different cares and expences. The family of the Fabii showed a generosity and love of their country that has been the admiration of all ages. They applied to the senate, and by the mouth of the consul demanded as a favour that they would be pleased to transfer the care and expences of the garrison necessary to oppose the enterprizes of the Veientes to their house, which required an assiduous rather than a numerous body, promising to support with dignity the honour of the Roman name in that post. Every body was charmed with so noble and unheard-of an offer; and it was accepted with great acknowledgment. The news spread over the whole city, and nothing was talked of but the Fabii. Every body praised, every body admired and extolled them to the skies. "If there were two more such families in Rome," said they, "the one might take upon them the war against the Volsci, and the other against the Æqui, whilst the commonwealth remained quiet, and the forces of particulars subdued the neighbouring states."

Early the next day the Fabii set out, with the consul at their head, robed, and with his insignia. Never was there so small, and at the same time so illustrious, an army seen; for which we have the authority of Livy. Three hundred and six soldiers, all patricians, and of the same family, of whom not one but might be judged worthy of commanding an army, march against the Veii full of courage and alacrity, under a captain of their own name, Fabius. They were followed by a body of their friends and clients, animated by the same spirit and zeal, and actuated only by great and noble views. The whole city flocked to see so fine a sight; praised those generous soldiers in the highest terms; and promised them consulships, triumphs, and the most glorious rewards. As they passed before the capitol and the other temples, every body implored the gods to take them into their protection; to favour their departure and undertaking, and to afford them a speedy and happy return. But those prayers were not heard. When they arrived near the river Crimera, which is not far from Veii,

they built a fort upon a very rough and steep mountain for the security of the troops, which they surrounded with a double fosse, and flanked with several towers. This settlement, which prevented the enemy from cultivating their ground, and ruined their commerce with strangers, incommoded them extremely. The Veientes not finding themselves strong enough to ruin the fort which the Romans had erected, applied to the Hetrurians, who sent them very considerable aid. In the mean time the Fabii, encouraged by the great success of their incursions into the enemy's country, made farther progress every day. Their excessive boldness made the Hetrurians conceive thoughts of laying ambuscades for them in several places. During the night they seized all the eminences that commanded the plain, and found means to conceal a great number of troops upon them. The next day they dispersed more cattle about the country than they had done before. The Fabii being apprized that the plains were covered with flocks and herds, and defended by only a very small number of troops, they quitted their fort, leaving in it only a sufficient number to guard it. The hopes of a great booty quickened their march. They arrived at the place in order of battle; and were preparing to attack the advanced guard of the enemy, when the latter, who had their orders, fled without staying till they were charged. The Fabii, believing themselves secure, seized the shepherds, and were preparing to drive away the cattle. The Hetrurians then quitted their skulking places, and fell upon the Romans from all sides, who were most of them dispersed in pursuit of their prey. All they could do was to rally immediately; and that they could not effect without great difficulty. They soon saw themselves surrounded on all sides, and fought like lions, selling their lives very dear. But finding that they could not sustain this kind of combat long, they drew up in a wedge, and advancing with the utmost fury and impetuosity, opened themselves a passage through the enemy that led to the side of the mountain. When they came thither, they halted, and fought with fresh courage, the enemy leaving them no time to respire. As they were upon the higher ground, they defended themselves with advantage, notwithstanding their small number; and beating down the enemy, who spared no pains in the attack, they made a great slaughter of them. But the Veientes having gained the top of the mountain by taking a compass, fell suddenly upon them, and galled them exceedingly from above with a continual shower of darts. The Fabii defended themselves to their last breath, and were all killed to a man. The Roman people were highly affected with the loss of this illustrious band of patriots. The day of their defeat was ranked amongst their unfortunate days, called *nefasti*, on which the tribunals were shut up, and no public affair could be negotiated, or at least concluded. The memory of these public spirited patricians, who had so generously sacrificed their lives and fortunes for the service of the state, could not be too much honoured.

PATRIPASSIANS, PATRIPASSIANI, in church-history, a Christian sect, who appeared about the latter end of the second century; so called, from their ascribing the passion to the Father; for they asserted the unity of God in such a manner as to destroy all distinctions.

Patricians
Patricians

Patroclus, distinctions of persons, and to make the Father and Son precisely the same; in which they were followed by the Sabelians and others. The author and head of the Patristians was Praxeas, a philosopher of Phrygia in Asia. Swedenbourg and his followers seem to hold the same faith.

PATROCLUS, a Grecian chief at the Trojan war. He was the son of Menæstus, by Sthenela, whom some call *Philomela* or *Polymela*. The murder of Clytemnestra, the son of Amphidamas, by accident, in the time of his youth, made him fly from Opus, where his father reigned. He went to the court of Peleus king of Phthia. He was cordially received, and contracted the most intimate friendship with Achilles the king's son. When the Greeks went to the Trojan war, Patroclus went with them at the express desire of his father, who had visited the court of Peleus; and he accordingly embarked with ten ships from Phthia. He was the constant companion of Achilles; lodged in the same tent; and when he refused to appear in the field of battle, he said he had been offended by Agamemnon, Patroclus imitated his example, and by his absence was the cause of much evil to the Greeks. At last, however, Nestor prevailed upon him to return to the war, and Achilles permitted him to appear in his armour. The bravery of Patroclus, together with the terror which the sight of the arms of Achilles inspired, soon routed the victorious armies of the Trojans, and obliged them to fly to the city for safety. He would have broken down the walls; but Apollo, who interposed himself for the Trojans, opposed him; and Hector, at the instigation of that god, dismounted from his chariot to attack him as he attempted to strip one of the Trojans whom he had slain. This engagement was obstinate; but Patroclus was at length overpowered by the valour of Hector, and the interposition of Apollo. His arms became the property of the conqueror; and Hector would have severed his head from his body had not Ajax and Menelaus prevented it. His body was at last recovered, and carried to the Grecian camp, where Achilles received it with the loudest lamentations. His funerals were observed with the greatest solemnity. Achilles sacrificed near the burning pile twelve young Trojans, four of his horses, and two of his dogs; and the whole was concluded by the exhibition of funeral games, in which the conquerors were liberally rewarded by Achilles. The death of Patroclus, as described by Homer, gave rise to new events. Achilles for ot his resentment against Agamemnon, and entered the field to avenge the fall of his friend; and his anger was gratified only by the slaughter of Hector, who had more powerfully kindled his wrath by appearing at the head of the Trojan armies in the armour which had been taken from the body of Patroclus. The patronymic of Actorides is often applied to Patroclus, because Actor was father to Menæstus.

PATROL, in war, a round or march made by the guards or watch in the night-time, to observe what passes in the streets, and to secure the peace and tranquillity of a city or camp. The patrol generally consists of a body of five or six men, detached from a body on guard, and commanded by a serjeant.

They go every hour of the night, from the beating of the tattoo until the reveille: they are to walk in the streets in garrisons, and all over the camp in the field,

to prevent disorders, or any number of people from assembling together: they are to see the lights in the soldiers barracks put out, and to take up all the soldiers they find out of their quarters. Sometimes patrols consist of an officer and 30 or 40 men, as well infantry as cavalry; but then the enemy is generally near at hand, and consequently the danger greater.

PATRON, among the Romans, was an appellation given to a master who had freed his slave. As soon as the relation of master expired, that of patron began: for the Romans, in giving their slaves their freedom, did not despoil themselves of all rights and privileges in them; the law still subjected them to considerable services and duties towards their patrons, the neglect of which was very severely punished.

Patron was also a name which the people of Rome gave to some great man, under whose protection they usually put themselves; paying him all kinds of honour and respect, and denouncing themselves his clients; while the patron, on his side, granted them his credit and protection. They were therefore mutually attached and mutually obliged to each other; and by this means, in consequence of reciprocal ties, all those seditions, jealousies, and animosities, which are sometimes the effect of a difference of rank, were prudently avoided: for it was the duty of the patron to advise his clients in points of law, to manage their suits, to take care of them as of his own children, and secure their peace and happiness. The clients were to assist their patrons with money on several occasions; to ransom them or their children when taken in war; to contribute to the portions of their daughters; and to defray, in part, the charges of their public employments. They were never to accuse each other, or take contrary sides; and if either of them was convicted of having violated this law, the crime was equal to that of treason, and any one was allowed to kill the offender with impunity. This patronage was a tie as effectual as any consanguinity or alliance, and had a wonderful effect towards maintaining union and concord among the people for the space of 600 years; during which time we find no dissensions nor jealousies between the patrons and their clients, even in the times of the republic when the populace frequently mutinied against those who were most powerful in the city.

PATRON, in the church of Rome, a saint whose name a person bears, or under whose protection he is put, and whom he takes particular care to invoke; or a saint in whose name a church or order is founded.

PATRON, in the canon or common law, is a person who, having the advowson of a parsonage, vicarage, or the like spiritual promotion, belonging to his manor, hath on that account the gift and disposition of the benefice, and may present to it whenever it becomes vacant. The patron's right of disposing of a benefice originally arises either from the patron or his ancestor, &c. being the founders or builders of the church; from their having given lands for the maintenance thereof; or from the church's being built on their ground; and frequently from all three together.

PATRONAGE, or **ADVOWSON**, a sort of incorporeal hereditament, consisting in the right of presentation to a church or ecclesiastical benefice. *Advowson*, *advocatio*, signifies in *clientelam recipere*, the taking

Patron,
Patronage.

Patronage. taking into protection; and therefore is synonymous with patronage, *patronatus*: and he who has the right of advowson is called the *patron* of the church. For when lords of manors first built churches on their own demesnes, and appointed the tithes of those manors to be paid to the officiating ministers, which before were given to the clergy in common (from whence arose the division of parishes), the lord who thus built a church, and endowed it with glebe or land, had of common right a power annexed of nominating such minister as he pleased (provided he were canonically qualified) to officiate in that church, of which he was the founder, endower, maintainer, or, in one word, the patron.

*By Advowson
Commentaries
et c.*

Advowsons are either advowsons *appendant*, or advowsons *in gross*. Lords of manors being originally the only founders, and of course the only patrons, of churches, the right of patronage or presentation, so long as it continues annexed to the possession of the manor, as some have done from the foundation of the church to this day, is called an *advowson appendant*: and it will pass, or be conveyed, together with the manor, as incident and appendant thereto, by a grant of the manor only, without adding any other words. But where the property of the advowson has been once separated from the property of the manor by legal conveyance, it is called an *advowson in gross*, or at large, and never can be appendant any more; but it is for the future annexed to the person of its owner, and not to his manor or lands.

Advowsons are also either *presentative*, *collative*, or *donative*. An advowson *presentative*, is where the patron hath a right of presentation to the bishop or ordinary, and moreover to demand of him to institute his clerk if he finds him canonically qualified: and this is the most usual advowson. An advowson *collative*, is where the bishop and patron are one and the same person: in which case the bishop cannot present to himself; but he does, by the one act of collation, or conferring the benefice, the whole that is done in common cases, by both presentation and institution. An advowson *donative*, is when the king, or any subject by his licence, doth found a church or chapel, and ordains that it shall be merely in the gift or disposal of the patron; subject to his visitation only, and not to that of the ordinary; and vested absolutely in the clerk by the patron's deed of donation, without presentation, institution, or induction. This is said to have been anciently the only way of conferring ecclesiastical benefices in England; the method of institution by the bishop not being established more early than the time of Archbishop Becket in the reign of Henry II. and therefore, though pope Alexander III. in a letter to Becket, severely inveighs against the *privilegium consuetudo*, as he calls it, of investiture conferred by the patron only, this however shows what was then the common usage. Others contend that the claim of the bishops to institution is as old as the first planting of Christianity in this island; and in proof of it they allege a letter from the English nobility to the pope in the reign of Henry the third, recorded by Matthew Paris, which speaks of presentation to the bishop as a thing immemorial. The truth seems to be, that, where the benefice was to be conferred on a mere layman, he was first presented to the bishop in order to receive ordination,

who was at liberty to examine and refuse him: but where the clerk was already in orders, the living was usually vested in him by the sole donation of the patron; till about the middle of the 12th century, when the pope and his bishops endeavoured to introduce a kind of feudal dominion over ecclesiastical benefices, and, in consequence of that, began to claim and exercise the right of institution universally, as a species of spiritual investiture.

Patronymic

However this may be, if, as the law now stands, the true patron once waives this privilege of donation, and presents to the bishop, and his clerk is admitted and instituted, the advowson is now become for ever presentative, and shall never be donative any more. For these exceptions to general rules and common right are ever looked upon by the law in an unfavourable view, and construed as strictly as possible. If therefore the patron, in whom such peculiar right resides, does once give up that right, the law, which loves uniformity, will interpret it to be done with an intention of giving it up for ever; and will therefore reduce it to the standard of other ecclesiastical livings. See further, Law, Part III. Sect. v. N^o clxx. §—10.

Arms of Patronage, in heraldry, are those on the top of which are some marks of subjection and dependence: thus the city of Paris lately bore the fleurs-de-lis in chief, to show her subjection to the king; and the cardinals, on the top of their arms, bear those of the pope, who gave them the hat, to show that they are his creatures.

PATRONYMIC, among grammarians, is applied to such names of men or women as are derived from those of parents or ancestors.

Patronymics are derived, 1. From the father; as Pelides, *i. e.* Achilles the son of Peleus. 2. From the mother; as Philyrides, *i. e.* Chiron the son of Philyra. 3. From the grandfather on the father's side; as Æacides, *i. e.* Achilles the grandson of Æacus. 4. From the grandfather by the mother's side; as Atlantiades, *i. e.* Mercury the grandson of Atlas. And, 5. From the kings and founders of nations; as Romulidæ, *i. e.* the Romans, from their founder king Romulus.

The termination of Greek and Latin patronymics are chiefly four, *viz.* *des*, of which we have examples above; *as*, as Thaumantias, *i. e.* Iris the daughter of Thaumias; *is*, as Atlantis, *i. e.* Electra the daughter of Atlas; and *ne*, as Nerine, the daughter of Nereus. Of these terminations *des* is masculine; and *as*, *is*, and *ne*, feminine: *des* and *ne* are of the first declension, *as* and *is* of the third.

The Russians, in their usual mode of address, never prefix any title or appellation of respect to their names; but persons of all ranks, even those of the first distinction, call each other by their Christian names, to which they add a patronymic. These patronymics are formed in some cases by adding *Vitch* (the same as our *Fitz*, as Fitzherbert, or the son of Herbert) to the Christian name of the father; in others by *Of* or *Ef*; the former is applied only to persons of condition, the latter to those of inferior rank. Thus,

Ivan Ivanovitch, Ivan Ivanof, is Ivan the son of Ivan: Peter Alexievitch, Peter Alexeof, Peter the son of Alexey.

The female patronymic is *Efna* or *Ofna*, as Sophia Alex-

tro^s Alexeefna, or Sophia the daughter of Alexey; Maria
Ivanofna, or Maria the daughter of Ivan.

Great families are also in general distinguished by a surname; as those of Romanof, Galitzin, Sheremetof, &c.

PATROS, mentioned by Jeremiah and Ezekiel, appears from the context to be meant of a part of Egypt. Bocchart thinks it denotes the Higher Egypt: the Septuagint translate it the country of *Patharis*; in Pliny we have the *Nomes Phaturis* in the Thebais; in Ptolemy, *Pathyris*, probably the metropolis. From the Hebrew appellation *Patros* comes the gentilitious name *Pathusim*, Moses.

PATRU (Oliver), a counsellor in parliament, and dean of the French academy, was born at Paris in 1624. He had an excellent faculty both of speaking and writing. Upon his admission into the French academy in 1640, he made an oration of thanks, that gave rise to the custom of admisory speeches, which are still in use in that society. Mr de Vaugelas owns himself much indebted to him for his assistance in composing his remarks on the French tongue, of which he was by far the greatest master in France; so that he was consulted as an oracle by all the best writers of that nation.

Patru was estimable for the qualities of his heart, as well as for those of the head: was honest, generous, sincere; and preserved a gayness of character, which no ill fortune could alter or affect. For this famous advocate, in spite of all his great talents, lived almost in a state of indigence. The love of the belles lettres made him neglect the law; and the barren glory of being an oracle to the best French writers had more charms for him, than all the profits of the bar. Hence he became so poor, as to be reduced to the necessity of selling his books, which seemed dearer to him than his life; and would actually have sold them for an under-price, if Boileau had not generously advanced him a larger sum, with this further privilege, that he should have the use of them as long as he lived. His death was preceded by a tedious illness, during which he received a present of 500 crowns from Colbert, as a mark of the esteem which the king had for him. He died the 16th of January 1681. The prodigious care and exactness with which he retouched and finished every thing he wrote, did not permit him to publish much. His miscellaneous works were printed at Paris in 1678, 4to; the third edition of which, in 1714, 4to, was augmented with several pieces. They consist of Pleadings, Orations, Letters, Lives of some of his Friends, Remarks upon the French Language, &c.

PATTANS, PATANS, or AFGHANS, a very warlike race of men, who had been subjects of the vast empire of Bochara. They revolted under their governor Abstagi, in the 10th century, and laid the foundation of the empire of Ghizni or Gazna. In the Dissertation prefixed to vol. III. of Dow's History, we have this account of the Pattans.

"They are divided into distinct communities, each of which is governed by a prince, who is considered by his subjects as the chief of their blood, as well as their sovereign. They obey him without reluctance, as they derive credit to their family by his greatness. They attend him in his wars with the attachment

which children have to a parent; and his government, though severe, partakes more of the rigid discipline of a general than the caprice of a despot. Rude, like the face of their country, and fierce and wild as the storms which cover their mountains, they are addicted to incursions and depredations, and delight in battle and plunder. United firmly to their friends in war, to their enemies faithless and cruel, they place justice in force, and conceal treachery under the name of address."

The empire, which took its rise from the revolt of the Pattans, under a succession of warlike princes rose to a surprising magnitude. In the beginning of the 11th century, it extended from Ispahan to Bengal, and from the mouths of the Indus to the banks of the Jaxartes, which comprehends at least half of the continent of Asia. They had fled to the mountains on the borders of Persia, that they might escape the sword, or avoid submitting to the conquerors of India; and there they formed their state, which the Moguls were never able thoroughly to subdue. Indeed they sometimes exercised depredations on the adjacent countries; nor was it possible for the Moguls either to prevent it or to extirpate them. They were sensible that the climate and soil of the delicious plains would only serve to rob them of that hardness they contracted in the hills to which they were confined; they, therefore, for a long time gave no indications of a desire to exchange them for more pleasing abodes, or a more accessible situation. This enabled them to brave the victorious army of Nadir Shah, whose troops they quietly suffered to penetrate into Hindostan, and waited his return with the spoils of that country.—They then harassed his army in the straits and defiles of the mountains, and proved themselves such absolute masters of the passes, that they forced him to purchase from them his passage into Persia.

In the beginning of the present century, they had spread themselves over the adjoining province of Kandabar; and such was the imbecility of the Persian empire at that time, that many other provinces and tributary states were also induced to revolt. When the king or shah of that time, whose name was *Hussein*, opposed the growing power of this warlike people, he was totally defeated, and Ispahan was besieged and obliged to surrender, after having suffered dreadful calamities, to an army consisting of only 30,000 men. In consequence of this, they brought about a revolution in Persia, and subjected it to themselves. This sovereignty, however, they only held for seven years and 21 days, having fallen a sacrifice to the enterprising spirit of Kouli Khan, or Nadir Shah. See PERSIA, and in the Appendix AFGHANS.

PAU, a town of France, in the province of Gascony and territory of Bearn, with a parliament, a mint, and a castle. "The city of Pau (says Wrexal)" * *They there*
will be for ever memorable in history, since it was the birth-place of Henry IV. That immortal prince was born in the castle, then the usual residence of the kings of Navarre. It stands on one of the most romantic and singular spots I have ever seen, at the west end of the town, upon the brow of a rock which terminates perpendicularly. Below runs the Gave, a river or rather a torrent which rises in the Pyrenees, and empties itself into the Adour. On the other side, about two miles

Pattans,
Pau.

* *They there*
France.

mile off, is a ridge of hills covered with vineyards, which produce the famous *Pau de Jurançon*, so much admired; and beyond all, at the distance of nine leagues, appear the Pyrenees themselves, covering the horizon from east to west, and bounding the prospect. The castle, though now in a state of decay, is still habitable; and the apartments are hung with tapestry, said to be the work of Jane queen of Navarre, and mother of Henry IV. Gaston IV. Count de Foix, who married Leonora herself of the crown of Navarre, began the edifice in 1464; but his successor Henry d'Albret completed and enlarged it about the year 1519, when he made choice of the city of Pau for his residence, and where, during the remainder of his reign, he held his little court. In a chamber, which by its size was formerly a room of state, is a fine whole length portrait of that Jane queen of Navarre whom I have just mentioned. Her dress is very splendid, and resembles that in which our Elizabeth is usually painted. Her head-dress is adorned with pearls; round her neck she wears a ruff; and her arms, which are likewise covered with pearls, are concealed by her habit quite down to the wrist. At her waist hangs by a chain a miniature portrait. The fingers of her right hand play on the strings of a guitar; and in her left she holds an embroidered handkerchief. The painter has drawn her as young, yet not in the first bloom of youth. Her features are regular, her countenance thin, but rather inclining to long; the eyes hazel, and the eye-brows finely arched. Her nose is well formed though large, and her mouth pretty. She was a great princess, of high spirit, and undaunted magnanimity. Her memory is not revered by the French historians, because she was the protectress of the Huguenots and the friend of Cognac; but the actions of her life evince her distinguished merit.

"In one of the adjoining chambers, is another portrait of Henry IV. himself when a boy; and on the second floor is the apartment in which he was born. The particulars of his birth are in themselves so curious, and as relating to so great and good a prince are so peculiarly interesting, that I doubt not you will forgive my enumerating them, even though you should have seen them elsewhere.—His mother Jane had already lost two sons, the duke de Beaumont and the count de Marle. Henry d'Albret, her father, anxious to see an heir to his dominions, enjoined her (when she accompanied her husband Anthony of Bourbon to the wars of Picardy against the Spaniards), if she proved with child, to return to Pau, and to lie in there, as he would himself superintend the education of the infant from the moment of its birth. He threatened to disinherit her if she failed to comply with this injunction. The princess, in obedience to the king's command, being in the ninth month of her pregnancy, quitted Compiègne in the end of November, traversed all France in 15 days, and arrived at Pau, where she was delivered of a son on the 13th December 1553. She had always been desirous to see her father's will, which he kept in a golden box; and he promised to show it to her, provided she admitted of his being present at her delivery, and would during the pains of her labour sing a song in the Bearnois language. Jane had courage enough to perform this unusual request;

and the king being called on the first news of her illness, she immediately sung a Bearnois song, beginning, 'Notre Dame du bout du pont, aidez moi en cette heure.'—As she finished it, Henry was born. The king instantly performed his promise, by giving her the box, together with a golden chain, which he tied about her neck; and taking the infant into his own apartment, began by making him swallow some drops of wine, and rubbing his lips with a roset of gerlie. They still show a tortoise shell which served him for a cradle, and is preserved on his count. Several of the ancient sovereigns of Navarre resided and died in the castle of Pau. Francis Pavlus, who ascended the throne in 1479, died here in 1483."

Pau is a handsome city, well built, and contains near 6000 inhabitants. It is a modern place, having owed its existence entirely to the castle, and to the residence of the kings of Navarre. W. Long. c. 4. N. Lat. 43. 15.

PAVAN, or PAVANE, a grave dance used among the Spaniards, and borrowed from them; wherein the performers make a kind of wheel or tail before each other, like that of *pavo*, "a peacock;" from whence the name is derived. The pavane was formerly in great repute; and was danced by gentlemen with cap and sword; by those of the long robe in their gowns, by princes with their mantles, and by the ladies with their gown tails trailing on the ground. It was called the *grand ball*, from the solemnity with which it was performed. To moderate its gravity, it was usual to introduce several flourishes, passades, capers, &c. by way of epifodes. Its tablature or score is given at large by Choynet Arbeau in his *Orcheographie*.

PAVESTA, in botany: A genus of the monogynia order, belonging to the tetrandria class of plants; and in the natural method ranking under the 47th order, *Stellatæ*. The corolla is monopetalous and funnel-shaped above: the stigma curved; the berry dispersum.

PAVIA, an ancient and celebrated town of Italy, in the duchy of Milan, and capital of the Pavese, with an university and bishop's see. It was anciently called *Ticinum*, from its situation on that river, and lies 20 miles to the southward of Milan. It was formerly the capital of the Longobardic kingdom, and is still remarkable for the broadness of its streets, the beauty and richness of some of its churches, and for its university, founded by Charlemagne, and for several other literary institutions. Here is a bishop's see, which was once the richest in Italy, but is now dependent on the pope; and upon the whole the city is gone to decay, its trade being ruined through the exactions of the government. The few objects within it worth the public attention belong to the clergy or monks; and the church and convent of the Carthusians are inexpressibly noble, the court of the convent being one of the finest in the world, and surrounded by a portico supported by pillars, the whole a mile in circumference. It is defended by strong walls, large ditches, good ramparts, excellent bastions, and a bridge over the river Tassin. In the centre of the town is a strong castle, where the duke of Milan was wont to reside. There are a great number of magnificent castles, and some colleges. It was taken by the duke of Savoy in 1706; by the

French

tion, French in 1733; by the French and Spaniards in 1745; but retaken by the Austrians in 1746. E. Long. 9. 5. N. Lat. 45. 10.

PAVILION, in architecture, signifies a kind of turret or building, usually insulated, and contained under a single roof; sometimes square, and sometimes in form of a dome: thus called from the resemblance of its roof to a tent.

Pavilions are sometimes also projecting pieces, in the front of a building, marking the middle thereof; sometimes the pavilion flanks a corner, in which case it is called an *angular pavilion*. The Louvre is flanked with four pavilions: the pavilions are usually higher than the rest of the building. There are pavilions built in gardens, commonly called *summer-houses*, *pleasure-houses*, &c. Some castles or forts consist only of a single pavilion.

PAVILION, in military affairs, signifies a tent raised on posts, to lodge under in the summer-time.

PAVILION, is also sometimes applied to flags, colours, ensigns, standards, banners, &c.

PAVILION, in heraldry, denotes a covering in form of a tent, which invests or wraps up the armories of divers kings and sovereigns, depending only on God and their sword.

The pavilion consists of two parts; the top, which is the chapeau, or coronet; and the curtain, which makes the mantle.

None but sovereign monarchs, according to the French heralds, may bear the pavilion entire, and in all its parts. Those who are elective, or have any dependence, say the heralds, must take off the head, and retain nothing but the curtains.

PAVILIONS, among jewellers, the undersides and corners of the brilliants, lying between the girdle and the collet.

PAVING, the construction of ground floors, streets, or highways, in such a manner that they may be conveniently walked upon. In Britain, the pavement of the grand streets, &c. are usually of flint, or rubble-stone; courts, stables, kitchens, halls, churches, &c. are paved with tiles, bricks, flags, or fire stone; sometimes with a kind of free-stone and rag-stone.

In some streets, *e. gr.* of Venice, the pavement is of brick: churches sometimes are paved with marble, and sometimes with mosaic-work, as the church of St Mark at Venice. In France, the public roads, streets, courts, &c. are all paved with gres or gritt, a kind of free-stone.

In Amsterdam and the chief cities of Holland, they call their brick pavement the *burgher-masters pavement*, to distinguish it from the stone or flint pavement, which usually takes up the middle of the street, and which serves for carriages; the brick which borders it being destined for the passage of people on foot.

Pavements of free-stone, flint, and flags, in streets, &c. are laid dry, *i. e.* in a bed of sand; those of courts, stables, ground-rooms, &c. are laid in a mortar of lime and sand; or in lime and cement, especially if there be vaults or cellars underneath. Some masons, after laying a floor dry, especially of brick, spread a thin mortar over it; sweeping it backwards and forwards to fill up the joints. The several kinds of pavement are as various as the materials of which they are composed,

and whence they derive the name by which they are distinguished; as,

Paving

1. *Pebble-paving*, which is done with stones collected from the sea-beach, mostly brought from the islands of Guernsey and Jersey: they are very durable, indeed the most so of any stone used for this purpose. They are used of various sizes, but those which are from six to nine inches deep, are esteemed the most serviceable. When they are about three inches deep, they are denominated *bolders* or *bowlers*; these are used for paving court-yards, and other places not accustomed to receive carriages with heavy weights; when laid in geometrical figures, they have a very pleasing appearance.

2. *Rag-paving* was much used in London, but is very inferior to the pebbles; it is dug in the vicinity of Maidstone in Kent, from which it has the name of *Kentish rag-stone*; there are squared stones of this material for paving coach-tracks and foot-ways.

3. *Purbeck pitchens*; square stones used in footways; they are brought from the island of Purbeck, and also frequently used in court-yards; they are in general from six to ten inches square, and about five inches deep.

4. *Squared paving*, for distinction by some called *Scotch paving*, because the first of the kind paved in the manner that has been and continues to be paved, came from Scotland; the first was a clear close stone, called *blue whynn*, which is now disused, because it has been found inferior to others since introduced in the order they are hereafter placed.

5. *Granite*, a hard material, brought also from Scotland, of a reddish colour, very superior to the blue whynn quarry, and at present very commonly used in London.

6. *Guernsey*, which is the best, and very much in use; it is the same stone with the pebble before spoken of, but broken with iron hammers, and squared to any dimensions required of a prismoidal figure, set with its smallest base downwards. The whole of the foregoing paving should be bedded and paved in small gravel.

7. *Purbeck paving*, for footways, is in general got in large surfaces about 2½ inches thick; the blue sort is the hardest and the best of this kind of paving.

8. *Yorkshire paving*, is an exceeding good material for the same purpose, and is got of almost any dimensions of the same thickness as the Purbeck. This stone will not admit the wet to pass through it, nor is it affected by the frost.

9. *Ryegate*, or *fire-stone paving*, is used for hearths, stoves, ovens, and such places as are liable to great heat, which does not affect the stone if kept dry.

10. *Newcastle flags*, are stones about two feet square, and 1½ or two inches thick; they answer very well for paving out-offices: they are somewhat like the Yorkshire.

11. *Portland paving*, with stone from the island of Portland; this is sometimes ornamented with black marble dots.

12. *Swedland paving*, is a black slate dug in Leicestershire, and looks well for paving halls, or in party-coloured paving.

13. *Marble paving*, is mostly variegated with different marbles, sometimes inlaid in mosaic.

14. *Fiat brick paving*, done with brick laid in sand, mortar,

Paving,
Paul.

mortar, or grout, as when liquid lime is poured into the joints.

15. *Brick-on-edge paving*, done with brick laid edge-wise in the same manner.

16. Pricks are also laid flat or edgewise in herring-bone.

17. Bricks are also sometimes set endwise in sand, mortar, or grout.

18. Paving is also performed with paving bricks.

19. With ten inch tiles.

20. With foot tiles.

21. With clinkers for stables and outer offices.

22. With the bones of animals, for gardens, &c.

And, 23. We have knob-paving, with large gravel-stones, for porticoes, garden-seats, &c.

Pavements of churches, &c. frequently consist of stones of several colours; chiefly black and white, and of several forms, but chiefly squares and lozenges, artfully disposed. Indeed, there needs no great variety of colours to make a surprising diversity of figures and arrangements. M. Truchet, in the *Memoirs of the French Academy*, has shown by the rules of combination, that two square-stones, divided diagonally into two colours, may be joined together chequerwise 64 different ways: which appears surprising enough; since two letters or figures can only be combined two ways.

The reason is, that letters only change their situation with regard to the first and second, the top and bottom remaining the same; but in the arrangement of these stones, each admits of four several situations, in each whereof the other square may be changed 16 times, which gives 64 combinations.

Indeed, from a farther examination of these 64 combinations, he found there were only 32 different figures, each figure being repeated twice in the same situation, though in a different combination; so that the two only differed from each other by the transposition of the dark and light parts.

PAUL, formerly named SAUL, was of the tribe of Benjamin, a native of Tarsus in Cilicia, a Pharisee by profession; first a persecutor of the church, and afterwards a disciple of Jesus Christ, and apostle of the Gentiles. It is thought he was born about two years before our Saviour, supposing that he lived 68 years, as we read in a homily which is in the sixth volume of St Chrysostom's works. He was a Roman citizen (Acts xxii. 27, 28.), because Augustus had given the freedom of the city to all the freemen of Tarsus, in consideration of their firm adherence to his interests. His parents sent him early to Jerusalem, where he studied the law at the feet of Gamaliel a famous doctor (*id.* xxii. 3.) He made very great progress in his studies, and his life was always blameless before men; being very zealous for the whole observation of the law of Moses (*id.* xxvi. 4, 5.) But his zeal carried him too far; he persecuted the church, and insulted Jesus Christ in his members (1 Tim. i. 13.); and when the

Paul.

protomartyr St Stephen was stoned, Saul was not only consenting to his death, but he even stood by and took care of the clothes of those that stoned him (Acts vii. 58, 59.) This happened in the 33d year of the common era, some time after our Saviour's death.

At the time of the persecution that was raised against the church, after the death of St Stephen, Saul was one of those that showed most violence in distressing the believers (Gal. i. 13. and Acts xxvi. 11.) He entered into their houses, and drew out by force both men and women, loaded them with chains, and sent them to prison (Acts viii. 3. and xxii. 4.) He even entered into the synagogues, where he caused those to be beaten with rods that believed in Jesus Christ, compelling them to blaspheme the name of the Lord. And having got credentials from the high-priest Caiaphas, and the elders of the Jews, to the chief Jews of Damascus, with power to bring to Jerusalem all the Christians he should find there, he went away full of threats, and breathing nothing but blood (Acts ix. 1, 2, 3, &c.) But as he was upon the road, and now drawing near to Damascus, all on a sudden about noon, he perceived a great light to come from heaven, which encompassed him and all those that were with him. This splendor threw them on the ground; and Saul heard a voice that said to him, "Saul, Saul, why persecutest thou me?" It was Jesus Christ that spoke to him. To whom Saul answered, "Who art thou, Lord?" And the Lord replied to him, "I am Jesus of Nazareth whom thou persecutest; it is hard for thee to kick against the pricks." Saul, all in consternation, asked, "Lord, what is it that thou wouldst have me do?" Jesus bid him arise and go to Damascus, where the will of the Lord should be revealed to him.

Saul then rose from the ground, and felt that he was deprived of sight; but his companions led him by the hand, and brought him to Damascus, where he continued three days blind, and without taking any nourishment. He lodged at the house of a Jew named Judas. On the third day, the Lord commanded a disciple of his, named Ananias, to go to find out Saul, to lay his hands upon him, and to cure his blindness. And as Ananias made excuses, saying that this man was one of the most violent persecutors of the church, the Lord said to him, Go and find him, because this man is an instrument that I have chosen, to carry my name before the Gentiles, before kings, and before the children of Israel; for I will show him how many things he must suffer for my name. Ananias went therefore, and found Saul, laid his hand upon him, and restored him to his sight; then rising, he was baptized, and filled with the Holy Ghost. After this he continued some days with the disciples that were at Damascus, preaching in the synagogues, and proving that Jesus was the Messiah (A)

From Damascus he went into Arabia (Gal. i. 17.), probably

(A) The conversion of such a man, at such a time, and by such means, furnishes one of the most complete proofs that have ever been given of the divine origin of our holy religion. That Saul, from being a zealous persecutor of the disciples of Christ, became all at once a disciple himself, is a fact which cannot be controverted without overturning the credit of all history. He must therefore have been converted in the miracu-

Paul. probably into the neighbourhood of Damascus, being then under the government of Aretas king of Arabia; and having remained there for a little while, he returned to Damascus, where he began again to preach the gospel. The Jews could not bear to see the progress that the gospel made here; and so resolved to put him to death: and they gained to their side the governor of Damascus, who was to apprehend him, and to deliver him to them. Of this Saul had early notice; and knowing that the gates of the city were guarded night and day to prevent him from making his escape, he was let down over the wall in a basket. And coming to Jerusalem to see Peter (Gal. i. 38.), the disciples were afraid to have any correspondence with him, not believing him to be a convert. But Barnabas having brought him to the apostles, Saul related to them the manner of his conversion, and all that had followed in consequence of it. Then he began to preach both to the Jews and Gentiles; and spoke to them with such strength of argument, that not being able to withstand him in reasoning, they resolved to kill him. For this reason, the brethren brought him to Cæsarea of Pale-

stine, from whence he came, probably by sea, into his own country Tarsus in Cilicia.

There he continued about five or six years, from the year of Christ 37 to the year 43: when Barnabas coming to Antioch by the order of the apostles, and there having found many Christians, went to Tarsus to see Saul, and brought him with him to Antioch (Acts xi. 20, 25, 26.); where they continued together a whole year, preaching to and instructing the faithful. During this time, there happened a great famine in Judea (*id. ib.* 27, 28, &c.), and the Christians of Antioch having made some collections to assist their brethren at Jerusalem, they made choice of Paul and Barnabas to go thither with their offering. They arrived there in the year of Christ 44; and having acquitted themselves of their commission, they returned again to Antioch. They had not been there long before God warned them by the prophets he had in this church, that he had appointed them to carry his word into other places. Then the church betook themselves to fasting and praying, and the prophets Simeon, Lucius, and Manaen, laid their hands on

G 2

them,

culous manner in which he himself said he was, and of course the Christian religion be a divine revelation; or he must have been either an impostor, an enthusiast, or a dupe to the fraud of others. There is not another alternative possible.

If he was an impostor; who declared what he knew to be false, he must have been induced to act that part by some motive: (See MIRACLE). But the only conceivable motives for religious imposture are, the hopes of advancing one's temporal interest, credit, or power; or the prospect of gratifying some passion or appetite under the authority of the new religion. That none of these could be St Paul's motive for professing the faith of Christ crucified, is plain from the state of Judaism and Christianity at the period of his forsaking the former and embracing the latter faith. Those whom he left were the disposers of wealth, of dignity, of power, in Judea: those to whom he went were indigent men, oppressed, and kept from all means of improving their fortunes. The certain consequence therefore of his taking the part of Christianity was the loss not only of all that he possessed, but of all hopes of acquiring more; whereas, by continuing to persecute the Christians, he had hopes rising almost to a certainty of making his fortune by the favour of those who were at the head of the Jewish state, to whom nothing could so much recommend him as the zeal which he had shown in that persecution. As to credit or reputation, could the scholar of Gamaliel hope to gain either by becoming a teacher in a college of fishermen? Could he flatter himself, that the doctrines which he taught would, either in or out of Judea, do him honour, when he knew that "they were to the Jews a stumbling block, and to the Greeks foolishness?" Was it then the love of power that induced him to make this great change? Power! over whom? over a flock of sheep whom he himself had assisted to destroy, and whose very Shepherd had lately been murdered! Perhaps it was with the view of gratifying some licentious passion, under the authority of the new religion, that he commenced a teacher of that religion! This cannot be alleged; for his writings breathe nothing but the strictest morality, obedience to magistrates, order, and government, with the utmost abhorrence of all licentiousness, idleness, or loose behaviour, under the cloke of religion. We nowhere read in his works, that saints are above moral ordinances; that dominion is founded in grace; that monarchy is despotism which ought to be abolished; that the fortunes of the rich ought to be divided among the poor; that there is no difference in moral actions; that any impulses of the mind are to direct us against the light of our reason and the laws of nature; or any of those wicked tenets by which the peace of society has been often disturbed, and the rules of morality often broken, by men pretending to act under the sanction of divine revelation. He makes no distinctions like the impostor of Arabia in favour of himself; nor does any part of his life, either before or after his conversion to Christianity, bear any mark of a libertine disposition. As among the Jews, so among the Christians, his conversation and manners were blameless.—It has been sometimes objected to the other apostles, by those who were resolved not to credit their testimony, that, having been deeply engaged with Jesus during his life, they were obliged, for the support of their own credit, and from having gone too far to return, to continue the same professions after his death; but this can by no means be said of St Paul. On the contrary, whatever force there may be in that way of reasoning, it all tends to convince us, that St Paul must *naturally* have continued a Jew, and an enemy to Christ Jesus. If they were engaged on one side, he was as strongly engaged on the other. If shame withheld them from changing sides, much more ought it to have stopped him; who, from his superior education, must have been vastly more sensible to that kind of shame than the mean and illiterate fishermen of Galilee. The only other difference

Paul.

them, and sent them to preach whither the Holy Ghost should conduct them. And it was probably about this time, that is, about the year of Christ 44, that Paul being wrapt up into the third heaven, saw there ineffable things, and which were above the comprehension of man (2 Cor. xii. 2, 3, 4, and Acts xiii. 4, 5, 6, &c.)

Saul and Barnabas went first into Cyprus, where they began to preach in the synagogues of the Jews. When they had gone over the whole island, they there found a Jewish magician called Bar-jesus, who was with the proconsul Sergius Paulus; and who resisted them, and endeavoured to prevent the proconsul from embracing Christianity: whereupon St Paul struck him with blindness; by which miracle the proconsul, being an eye-witness of it, was converted to the Christian faith.

From this conversion, which happened at the city of Paphos, in the year of Christ 45, many think, that the apostle first began to bear the name of *Paul*, which St Luke always gives him afterwards, as is supposed in

memory of his converting Sergius Paulus. Some believe that he changed his name upon his own conversion; and Chrysostom will have this change to take place at his ordination, when he received his mission at Antioch; while others say, he took the name *Paul* only when he began to preach to the Gentiles: and, finally, several are of opinion, that he went by the names of both *Saul* and *Paul*, like many other Jews who had one Hebrew name and another Greek or Latin one.

From the isle of Cyprus, St Paul and his company went to Perga in Pamphylia, where John Mark left them, to return to Jerusalem: but making no stay at Perga, they came to Antioch in Pisidia; where going into the synagogue, and being desired to speak, St Paul made them a long discourse, by which he showed, that Jesus Christ was the Messiah foretold by the prophets, and declared by John the Baptist; that he had been unjustly put to death by the malice and jealousy of the Jews; and that he rose again the third day. They heard him very attentively; and he was desired to discourse

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was, that *they*, by quitting their Master after his death, might have preserved themselves; whereas *he*, by quitting the Jews, and taking up the cross of Christ, certainly brought on his own destruction.

As St Paul was not an impostor, so it is plain he was not an enthusiast. Heat of temper, melancholy, ignorance, and vanity, are the ingredients of which enthusiasm is composed; but from all these, except the first, the apostle appears to have been wholly free. That he had great fervour of zeal, both when a Jew and when a Christian, in maintaining what he thought to be right, cannot be denied; but he was at all times so much master of his temper, as, in matters of indifference, to "become all things to all men," with the most pliant condescension, bending his notions and manners to theirs, as far as his duty to God would permit; a conduct compatible neither with the stiffness of a bigot nor with the violent impulses of fanatical delusion. That he was not melancholy, is plain from his conduct in embracing every method which prudence could suggest to escape danger and shun persecution, when he could do it without betraying the duty of his office or the honour of his God. A melancholy enthusiast courts persecution; and when he cannot obtain it, afflicts himself with absurd penances: but the holiness of St Paul consisted only in the simplicity of a godly life, and in the unwearied performance of his apostolical duties. That he was ignorant, no man will allege who is not grossly ignorant himself; for he appears to have been master not only of the Jewish learning, but also of the Greek philosophy, and to have been very conversant even with the Greek poets. That he was not credulous, is plain from his having resisted the evidence of all the miracles performed on earth by Christ, as well as those that were afterward worked by the apostles; to the tame of which, as he lived in Jerusalem, he could not possibly have been a stranger. And that he was as free from vanity as any man that ever lived, may be gathered from all that we see in his writings, or know of his life. He represents himself as the least of the apostles, and not meet to be called an apostle. He says that he is the chief of sinners; and he prefers, in the strongest terms, universal benevolence to faith, and prophecy, and miracles, and all the gifts and graces with which he could be endowed. Is this the language of vanity or enthusiasm? Did ever fanatic prefer virtue to his own religious opinions, to illuminations of the spirit, and even to the merit of martyrdom?

Having thus shown that St Paul was neither an impostor nor an enthusiast, it remains only to be inquired, whether he was deceived by the fraud of others: but this inquiry needs not be long, for who was to deceive him? A few illiterate fishermen of Galilee? It was *morally* impossible for such men to conceive the thought of turning the most enlightened of their opponents, and the cruellest of their persecutors, into an apostle, and to do this by a fraud in the very instant of his greatest fury against them and their Lord. But could they have been so extravagant as to conceive such a thought, it was *physically* impossible for them to execute it in the manner in which we find his conversion to have been effected. Could they produce a light in the air, which at mid-day was brighter than the sun? Could they make Saul hear words from out of that light which were not heard by the rest of the company? Could they make him blind for three days after that vision, and then make scales fall off from his eyes, and restore him to sight by a word? Or, could they make him and those who travelled with him believe, that all these things had happened, if they had not happened? Most unquestionably no fraud was equal to all this.

Since then St Paul was neither an impostor, an enthusiast, nor deceived by the fraud of others, it follows, that his conversion was miraculous, and that the Christian religion is a divine revelation. See *Lytleton's Observations on the Conversion of St Paul*; a treatise to which it has been truly said, that infidelity has never been able to fabricate a specious answer, and of which this note is a very short and imperfect abridgement.

course again on the same subject the next Sabbath day; and several, both Jews and Gentiles, followed them, to receive particular instructions more at leisure. On the Sabbath day following, almost all the city met together to hear the word of God: but the Jews, seeing the concourse of people, were moved with envy at it; opposed, with blasphemies, what St Paul said; and not being able to bear the happy progress of the gospel in this country, they raised a persecution against the two apostles: whereupon Paul and Barnabas, shaking off the dust upon their feet against them, came from Antioch in Pisidia to Iconium. Being come thither, they preached in their synagogue, and converted a great number, both of Jews and Gentiles; and God confirmed their commission by a great number of miracles (Acts xiv. 1, 2, &c.) In the mean time, the unbelieving Jews, having incensed the Gentiles against Paul and Barnabas, and threatening to stone them, they were obliged to retire to Lystra and Derbe, cities of Lycaonia, where they preached the gospel. At Lystra, there was a man who had been lame from his mother's womb. This man fixing his eyes on St Paul, the apostle bid him rise, and stand upon his feet: whereupon he presently rose up, and walked; the people, seeing this miracle, cried out, that the gods were descended among them in the shape of men. They called Barnabas *Jupiter*, and Paul *Mercury*, because of his eloquence, and being the chief speaker. The priest of Jupiter brought also garlands and bulls before the gate, to offer sacrifices to them: but Paul and Barnabas tearing their clothes, and casting themselves into the middle of the multitude, cried out to them, Friends, what do you do? we are men as well as yourselves; and we are preaching to you to turn away from these vain superstitions, and to worship only the true God, who has made heaven and earth. But whatever they could say, they had much ado to restrain them from offering sacrifices to them.

In the mean time, some Jews of Antioch in Pisidia and of Iconium coming to Lystra, animated the people against the apostles. They stoned Paul, and drew him out of the city, thinking him to be dead. But the disciples gathering together about him, he rose up among them, entered again into the city, and the day after left it with Barnabas to go to Derbe. And having here preached the gospel also, they returned to Lystra, to Iconium, and to Antioch of Pisidia. Passing throughout Pisidia, they came to Pamphylia, and having preached the word of God at Perga, they went down into Attalia. From hence they set sail for Antioch in Syria, from whence they had departed a year before. Being arrived there, they assembled the church together, and told them the great things God had done by their means, and how he had opened to the Gentiles a door of salvation; and here they continued a good while with the disciples.

St Luke does not inform us of the actions of St Paul from the 45th year of Christ to the time of the council at Jerusalem, which was held in the 50th year of Christ. There is great likelihood that it was during this interval that St Paul preached the gospel from Jerusalem to Illyricum, as he informs us in his epistle to the Romans (xv. 19.); and this without making any stay in those places where others had preached before him. He does not acquaint us with

the particulars of these journeys, nor with the success of his preaching; but he says in general, that he had suffered more labours than any other, and had endured more prisons. He was often very near death itself, sometimes upon the water and sometimes among thieves. He run great dangers, sometimes from the Jews and sometimes among false brethren and perverse Christians; he was exposed to great hazards, as well in the cities as in the deserts: he suffered hunger, thirst, nakedness, cold, fastings, watchings (2 Cor. xi. 23—27.), and the fatigues inseparable from long journeys, which were undertaken without any prospect of human succour; in this very different from the good fortune of others who lived by the gospel, who received subsistence from those to whom they preached it, and who were accompanied always by religious women, who ministered to them in their necessary occasions. He made it a point of honour to preach gratis, working with his hands that he might not be chargeable to any one (1 Cor. ix. 1—15.); for he had learned a trade, as was usual among the Jews, which trade was to make tents of leather for the use of those that go to war (Acts xviii. 3.)

St Paul and St Barnabas were at Antioch when some persons coming from Judea (Acts xv. 1, 2, &c.) pretended to teach, that there was no salvation without circumcision, and without the observation of the other legal ceremonies. Epiphanius and Philaster say, that he that maintained this was Cerinthus and his followers. Paul and Barnabas withstood these new doctors; and it was agreed to send a deputation to the apostles and elders at Jerusalem about this question. Paul and Barnabas were deputed; and being arrived at Jerusalem, they reported to the apostles the subject of their commission. Some of the Pharisees that had embraced the faith, asserted, that the Gentiles that were converted ought to receive circumcision, and to observe the rest of the law. But the apostles and elders assembling to examine into this matter, it was by them decreed, that the Gentiles, who were converted to Christianity, should not be obliged to submit to the yoke of the law, but only to avoid idolatry, fornication, and the eating of things strangled, and blood.

St Paul and St Barnabas were then sent back to Antioch with letters from the apostles, which contained the decision of the question, and the resolution of that august assembly. The apostles also deputed Jude surnamed *Barjabas* and Silas, who were principal brethren, to go to Antioch with Paul and Barnabas to give their testimony also of what had been decreed at Jerusalem. Being arrived at Antioch, they assembled the faithful, read to them the apostles letter, and acquainted them, that it had been resolved to discharge them from the yoke of the ceremonial law. Some time after this, St Peter coming to Antioch and joining himself to the converted Gentiles, he lived with them without scruple; but some brethren happening to arrive there from Jerusalem, he separated himself from the Gentile converts, and did no longer eat with them: for which conduct St Paul publicly censured him (Gal. ii. 11—16.) St Paul (*id.* ii. 2, 3, &c.) in the same journey to Jerusalem declared openly to the faithful there the doctrine he preached among the Gentiles; and besides, discoursed of it in private among the chief of them in presence of Barnabas and Titus.

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St Peter, St James, and St John, with whom he had these conversations, could find nothing either to be added or amended in so pure and so sound a doctrine and demeanour. They saw with joy the grace that God had given him; they acknowledged that he had been appointed the apostle of the Gentiles, as St Peter had been of the circumcision. They concluded that Paul and Barnabas should continue to preach among the Gentiles; and only recommended to them to take care concerning the collections for the poor; that is to say, to exhort the converted Christians among the Gentiles, to assist the faithful brethren in Judea, who were in necessity; whether it were because they had sold and distributed their goods, or because they had been taken away from them (Heb. x. 34.)

After Paul and Barnabas had continued some days at Antioch, St Paul proposed to Barnabas to return and visit the brethren through all the cities wherein they had planted the gospel, to see in what condition they were. Barnabas consented to the proposal; but insisted upon taking John Mark along with them. This was opposed by Paul, which produced a separation between them. Barnabas and John Mark went together to Cyprus; and St Paul, making choice of Silas, crossed over Syria and Cilicia, and came to Derbe, and afterwards to Lystra (Acts xvi. 1, 2, &c.) Here they found a disciple called *Timothy*, whom St Paul took with him, and circumcised him that he might not offend the Jews of that country. When therefore they had gone over the provinces of Lycaonia, Phrygia, and Galatia, the Holy Ghost would not allow them to preach the gospel in the proconsular Asia, which contained Ionia, Æolia, and Lydia. They therefore went on to Mysia, and coming to Troas, St Paul had a vision in the night. A man, habited like a Macedonian, presented himself before him, and said, Pass into Macedonia and come and succour us. Immediately he set out on this journey, not doubting but that God had called him into this country.

Embarking therefore at Troas, they sailed to Neapolis. Thence they came to Philippi, where upon the sabbath-day they went near the river side, where the Jews had a place of devotion, and where they found some religious women, among whom was Lydia, who was converted and baptized, and invited the apostle and his company to lodge at her house. Another day, as they went to the same place of devotion, they happened to meet a maid servant possessed with a spirit of divination, who followed St Paul and his company, crying out, that these men were the servants of the most high God, who declared to the world the way of salvation. This she did for several days together; at last St Paul, turning himself towards her, said to the spirit, I command thee in the name of Jesus Christ to come out of the body of this woman: upon which it immediately left her. But the masters of this damsel, who made much money by her, drew Paul and Silas before the magistrates, and accused them of attempting to introduce a new religion into the city. For this the magistrates ordered them to be whipt with rods upon the back and shoulders, and afterwards sent them to prison.

Towards midnight, as Paul and Silas were singing hymns and praises to God, on a sudden there was a great earthquake, so that the foundations of the pri-

son were shaken, and all the doors flew open at the same time, and the fetters of the prisoners burst asunder. The gaoler being awakened at this noise, and seeing all the doors open, he drew his sword with an intention to kill himself, imagining that all the prisoners had made their escape. But Paul cried out to him, that he should do himself no mischief, for they were all safe. Then the gaoler entering and finding all the prisoners there, he brought out Paul and Silas from this place, asking them what he must do to be saved? Paul and Silas instructing him and all his family, gave them baptism. After this the gaoler set before them something to eat; and when the morning was come, the magistrates sent him word that he might release his prisoners, and let them go about their business. But Paul returned this answer to the magistrates; Ye have publicly whipped us with rods, being Roman citizens; ye have thrown us into prison; and now ye would privately dismiss us: But it shall not be so, for you yourselves shall come to fetch us out. The magistrates hearing that they were Roman citizens, came to excuse themselves; and having brought them out of prison, they desired them to depart out of their city. Paul and Silas went first to the house of Lydia, where having visited and comforted the brethren, they departed from Philippi.

Then passing through Amphipolis and Apollonia, they came to Thessalonica the capital city of Macedonia, where the Jews had a synagogue (Acts xvii. 1, &c.) Paul entered therein, according to his custom, and there preached the gospel to them for three Sabbath days successively. Some Jews and several profelytes believed in Jesus Christ, and united themselves to Paul and Silas: but the greatest part of the Jews being led away by a false zeal, raised a tumult in the city, and went to the house of Jason where St Paul lodged. But not finding him there, they took Jason and led him before the magistrates, where they accused him of harbouring in his house people that were disobedient to the ordinances of the emperor, and who affirmed that there was another king besides him, one Jesus whom they preached up. But Jason having given security to answer for the people who were accused, he was dismissed to his own house: and the night following the brethren conducted Paul and Silas out of the city, who went to Berea, where they began to preach in the synagogue. The Jews of Berea heard them gladly, and many of them were converted; as also several of the Gentiles and many women of distinction that were not Jewesses.

The Jews of Thessalonica being informed that Paul and Silas were at Berea, came thither and animated the mob against them; so that St Paul was forced to withdraw, leaving Silas and Timothy at Berea to finish the work he had so happily begun. Those who conducted St Paul embarked along with him, and brought him as far as Athens (Theod. in 1 Thessal.), where he arrived in the fifty-second year of Jesus Christ. As soon as he was got thither, he sent back those that had brought him, with orders to tell Silas and Timothy, that he desired them to follow him to Athens as soon as possible. In the mean time, he went into a synagogue of the Jews and preached to them as often as he had opportunity; and disputing with the philosophers who were frequent in that place,

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they

him before the Areopagus, accusing him of introducing a new religion. St Paul before the judges, pleaded in his own defence, that among other marks of superstition which he had found in that city, he had observed an altar inscribed, "To the unknown God." It was therefore this God whom they confessed that they knew not, that he came to make known to them. Afterwards he spoke to them of God the creator of heaven and earth, of the superintendence of a providence, of the last judgment, and of the resurrection of the dead. But after they had heard of the resurrection, some made scorn of him, and others desired to hear him another time. However some of them embraced the Christian faith, of which number was Dionysius a senator of the Areopagus, and a woman called *Damaris*, and several others with them.

St Timothy came from Berea to Athens according to the request of St Paul, and informed him of the persecution with which the Christians of Thessalonica were then afflicted. This obliged the apostle to send him into Macedonia, that he might comfort them and keep them steadfast (1 Thessal. iii. 1, 2, &c.) After this St Paul left Athens and went to Corinth, where he lodged with one Aquila a Jew, and by trade a tent-maker (Acts xviii. 1, 2, &c.) With this Aquila the apostle worked, as being of the same trade himself. But, however, he did not neglect the preaching of the gospel, which he performed every day in the synagogue; showing both to the Jews and Gentiles that Jesus was the Messiah. There he made several converts; and he tells us himself (1 Cor. i. 14—17. and xvi. 15.) that he baptized Stephanus and his whole house, with Crispus and Gaius. About the same time Silas and Timothy came to Corinth, and acquainted him with the good state of the faithful at Thessalonica; and soon after this, he wrote his first epistle to the Thessalonians, which is the first of all the epistles that he wrote; and not long after he wrote his second epistle to that church.

St Paul, now finding himself encouraged by the presence of Silas and Timothy, went on with the work of his ministry with new ardour, declaring and proving that Jesus Christ was the true Messiah. But the Jews opposing him with blasphemous and opprobrious words, he shook his clothes at them, and said, "Your blood be upon your own head; from henceforth I will go to the Gentiles." He then quitted the house of Aquila, and went to lodge with one Titus Justus, who was originlly a Gentile, but one that feared God. In the mean time the Lord appeared to St Paul in a vision, told him, that in Corinth he had much people; and this was the reason why the apostle continued there eight months.

But Gallio the pro-consul of Achaia being at Corinth, the Jews of that city rose up against Paul and carried him before Gallio, accusing him of attempting to introduce a new religion among them: however, Gallio sent them away, telling them he would not meddle with disputes that were foreign to his office. Paul continued some time longer at Corinth; but at last he set out for Jerusalem, where he had a mind to be present at the feast of Pentecost. Before he went on his journey, he cut off his hair at Cenchrea, because

he had completed his vow of Nazariteship, in which he had engaged himself. He arrived at Ephesus with Aquila and Priscilla, from whence he went to Cæsarea of Palestine, and thence to Jerusalem. Here having performed his devotions, he came to Antioch, where he stayed some time; and then passing from thence, he made a progress through all the churches of Galatia and Phrygia successively; and having gone over the higher provinces of Asia, he returned to Ephesus, where he abode three years; that is, from the year of Christ 54 to the year 57 (Acts xix. 1, 2, &c.)

St Paul having arrived at Ephesus, he found there some disciples that had been initiated by Apollos, who had only baptized them with the baptism of John. St Paul instructed them, baptized them with the baptism of Jesus Christ, and laid his hands on them; whereupon they received the Holy Ghost, the gifts of languages and of prophecy. The apostle afterwards went into the synagogue, and preached to the Jews for three months, endeavouring to convince them that Jesus Christ was the Messiah: but as he found them very obstinate, he separated himself from them, and taught daily in the school of one Tyrannus. He performed there several miracles, inasmuch, that the linen that had but touched his body, being afterwards applied to the sick, they were presently cured of their diseases, or delivered from the devils that possessed them. He also suffered much there, as well from the Jews as from the Gentiles; and he himself informs us (1 Cor. xv. 31, 32.), that after the manner of men he fought with beasts at Ephesus; that is to say, that he was exposed to wild beasts in the amphitheatre, so that it was expected he should have been devoured by them; but God miraculously delivered him: though some are of opinion, that the fight here mentioned by St Paul was nothing else but the scuffle he had with Demetrius the silver-smith and his companions, who were disappointed in their attempt of putting the apostle to death. It was during his abode at Ephesus that the apostle wrote his epistle to the Galatians.

After this St Paul proposed, at the instigation of the Holy Ghost, to pass through Macedonia and Achaia, and afterwards to go to Jerusalem, saying, that after he had been there, he must also see Rome; and having sent Timothy and Erastus before to Macedonia, he tarried some time in Asia. During this time, he received intelligence that domestic troubles had risen in the church of Corinth, and that abuses had begun to creep in; which made him resolve to write his first epistle to that church.

Soon after this, taking leave of the disciples, he departed for Macedonia (Acts xx. 1, 2, &c.) He embarked at Troas, took Timothy with him, and together passed into Macedonia (2 Cor. ii. 12. and vii. 5—15.) Titus came thither to him, and acquainted him with the good effects that his letter had produced among the Corinthians; and told him, that the collections that had been made by the church of Corinth for the faithful in Palestine were now ready; which engaged Paul to write a second letter to the Corinthians. St Paul, having passed through Macedonia, came into Greece or Achaia, and there continued three months. He visited the faithful of Corinth; and

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and having received their alms, as he was upon the point of returning into Macedonia, he wrote his epistle to the Romans.

At last he left Greece and came into Macedonia, in the year of Christ 58, intending to be at Jerusalem at the feast of Pentecost. He staid some time at Philippi, and there celebrated the feast of the passover. From hence he embarked and came to Troas, where he continued a week. On the first day of the week the disciples being assembled to break bread, as St Paul was to depart the day following, he made a discourse to them which held till midnight. During this time a young man called Eutychus, happening to sit in a window and fall asleep, fell down three stories high, and was killed by the fall. St Paul came down to him, and embraced him, and restored him to life again. Then he went up again, broke bread and eat it, and continued his discourse till day-break, at which time he departed. Three of his company took ship at Troas; but as for himself he went on foot as far as Assos, otherwise called *Aphonia*, and then embarked along with them at Mitylene. From hence he came to Miletus, whither the elders of the church of Ephesus came to see him; for he had not time to go to them, because he was desirous of being at Jerusalem at the feast of Pentecost.

When these elders were arrived at Miletus, St Paul discoursed with them, and told them that he was going to Jerusalem without certainly knowing what should happen to him; however he did not doubt but that he had much to suffer there, since in all cities the Holy Ghost had given him to understand, that chains and afflictions waited for him at Jerusalem. Nevertheless, he declared to them, that all this did not terrify him, provided he could but fulfil his ministry. After having exhorted them to patience, and having prayed along with them, he went on board, going straight to Coos, then to Rhodes, and thence to Patara (Acts xxi. 1, 2, &c.), where finding a ship that was bound for Phœnicia, they went on board and arrived safe at Tyre. Here they made a stop for seven days, and then going on, they arrived at Ptolemais, and thence at Cæsarea, where they found Philip the evangelist, who was one of the seven deacons. While St Paul was there, the prophet Agabus arrived there also from Judea; and having taken St Paul's girdle, he bound his own hands and feet with it, saying, "Thus shall the Jews of Jerusalem bind the man that owns this girdle, and shall deliver him up to the Gentiles." But St Paul's constancy was not shaken by all these predictions, and he told them, that he was ready, not only to suffer bonds, but death itself, for the name of Christ.

When he was come to Jerusalem, the brethren received him with joy; and the day following he went to see St James the less, bishop of Jerusalem, at whose house all the elders assembled. Paul gave them an account of what God had done among the Gentiles by his ministry. Then St James informed him, that the converted Jews were strangely prejudiced against him, because they were informed he taught the Jews that lived among the Gentiles and out of Palestine, that they ought to renounce the law of Moses, and no longer circumcise their children. Therefore, continued St James, we must assemble them here together, where

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you may speak to them yourself, and undeceive them. Moreover do this, that your actions may verify your words: join yourself to four men that are here, and who have taken upon them a vow of Nazaritiship; and that you may share in the merit of their action, contribute to the charge of their purification, and purify yourself also, that you may offer with them the offerings and sacrifices ordained for the purification of a Nazarite. See NAZARITE.

St Paul exactly followed this advice of St James, and on the next day went into the temple, where he declared to the priests, that in seven days these four Nazarites would complete their vow of Nazaritiship; and that he would contribute his share of the charges. But towards the end of these seven days, the Jews of Asia having seen him in the temple, moved all the people against him, laid hold of him, and cried out, "Help, ye Israelites, this is he that teaches every where against the law, and against the temple, and has brought Gentiles into the temple, and profaned this holy place." At the same time they laid hold on him, shut the gates of the temple, and would have killed him, had not Lyfias the tribune of the Roman garrison there run to his rescue, taken him out of their hands, and brought him into the citadel. St Paul being upon the steps, desired the tribune to suffer him to speak to the people, who followed him thither in a great multitude. The tribune permitted him, and St Paul, making a sign with his hand, made a speech in Hebrew (Acts xxii.), and related to them the manner of his conversion, and his mission from God to go and preach to the Gentiles. At his mentioning the Gentiles, the Jews began to cry out, "Away with this wicked fellow out of the world, for he is not worthy to live."

Immediately the tribune made him come into the castle, and ordered that he should be examined by whipping him, in order to make him confess the matter why the Jews were so incensed against him. Being now bound, he said to the tribune, "Is it lawful for you to whip a Roman citizen before you hear him?" The tribune hearing this, caused him to be unbound, and calling together the priests and the senate of the Jews, he brought Paul before them, that he might know the occasion of this tumult of the people. Then Paul began to speak to them to this purpose, (Acts xxiii.) : "Brethren, I have lived in all good conscience before God until this day." At which words, Ananias, son of Nebedeus, who was the chief-priest, ordered the by-standers to give him a blow in the face. At which St Paul said to him, "God shall smite thee, thou whited wall; for sittest thou to judge me after the law, and commandest me to be smitten contrary to the law?" Those that were present said to him, "Revilest thou God's high-priest?" St Paul excused himself by saying, that he did not know he was the high priest, "For it is written, thou shalt not speak evil of the ruler of thy people." Then perceiving that part of the assembly were Sadducees and part Pharisees, he cried out, "Brethren, I am a Pharisee, the son of a Pharisee; of the hope and resurrection of the dead I am called in question."

Then the assembly being divided in interests and opinions, and the clamour increasing more and more, the tribune ordered the soldiers to fetch him away out

of the assembly, and bring him into the castle. The following night the Lord appeared to Paul, and said to him, "Take courage, for as you have bore testimony of me at Jerusalem, so must you also at Rome." The day following, more than 40 Jews engaged themselves by an oath, not to eat or drink till they had killed Paul. They came, therefore, and made known their design to the priests and chiefs of the people, saying to them, "To-morrow cause Paul to appear before you, as if you would inquire more accurately into his affair, and before he can come to you, we will lie in wait for him and kill him." But St Paul, being informed of this conspiracy by his sister's son, acquainted the tribune with it; who gave orders that the night following he should be sent to Cæsarea, to Felix the governor, who had his ordinary residence there. Felix having received letters from Lyllias, and being informed that St Paul was of Cilicia, he told him he would hear him when his accusers should arrive.

Five days after, Ananias the high-priest and some of the senators came to Cæsarea, bringing with them Tertullus the orator, to plead against Paul. Tertullus accused him of being a seditious person, a disturber of the public peace; one who had put himself at the head of a sect of Nazarenes, and who made no scruple even to profane the temple, (*id.* xxiv.) But St Paul easily refuted these calumnies, and defied his accusers to prove any of the articles they had exhibited against him: he ended his discourse by saying, "That for the doctrine of the resurrection from the dead, his adversaries would have him condemned." Felix put off the further hearing of this cause till another time; and, some days afterwards, came himself with his wife Drusilla to hear Paul; and being in hopes that the apostle would purchase his freedom with a sum of money, he used him well, often sent for him, and had frequent conversations with him.

Two years having passed thus away, Felix made way for his successor Portius Festus; but being willing to oblige the Jews, he left Paul in prison. Festus being come to Jerusalem, the chief priests desired to send for Paul, with a design to fall upon him by the way. But Festus told them, they might come to Cæsarea, where he would do them justice. Hither the Jews came, and accused Paul of several crimes, of which they were able to prove nothing, (*id.* xxv.) Festus then proposed to the apostle to go to Jerusalem, and be tried there; but he answered, "That he was now at the emperor's tribunal, where he ought to be tried; and that he appealed to Cæsar:" whereupon Festus, having conferred with his council, told him, that therefore to Cæsar he should go.

Some days after, King Agrippa and his wife Bernice coming to Cæsarea, desired to hear Paul; who pleaded his cause with such ability, that Agrippa exclaimed, "Almost thou persuadest me to be a Christian." See AGRIPIA.

As soon, therefore, as it was resolved to send Paul into Italy, he was put on board a ship at Adramyttum, a city of Mysia; and having passed over the seas of Cilicia and Pamphylia, they arrived at Myra in Lycia, where, having found a ship that was bound for Italy, they went on board, (*id.* xxvii.) But the season being far advanced (for it was at least the latter end of Septem-

ber), and the wind proving contrary, they with much difficulty arrived at the Fair Haven, a port in the isle of Crete. St Paul advised them to winter there: however, others were of opinion they had better go to Phenice, another harbour of the same island; but as they were going thither, the wind drove them upon a little island called *Utica*, where the mariners, fearing to strike upon some bank of sand, they lowered their mast, and surrendered themselves to the mercy of the waves. Three days after this, they threw overboard the tackling of the ship. Neither sun nor stars had appeared now for 14 days. In this extreme danger, an angel appeared to St Paul, and assured him, that God had given him the lives of all that were in the ship with him; which were in all 276 souls. St Paul told them of his vision, exhorted them to take courage, and promised them that they should all come alive into an island; and that the vessel only should be lost. On the 14th night the seamen cast out the lead, and thought by their sounding that they approached near to some land. They were attempting to save themselves by going into the boat; but St Paul told the centurion and the soldiers, that except the sailors continued in the ship, their lives could not be saved. Then the soldiers cut the ropes of the boat, and let her drive. About day-break, St Paul persuaded them to take some nourishment, assuring them that not a hair of their heads should perish. After his example, they took some food, and when they had eat, they lightened their vessel, by throwing the corn into the sea. Day being come, they perceived a shore, where they resolved, if possible, to bring the ship to. But the vessel having struck against a neck of land that run out into the sea, so that the head remained fixed, and the stern was exposed to the mercy of the waves; the soldiers, fearing lest any of the prisoners should make their escape by swimming, were for putting them all to the sword. But the centurion would not suffer them, being willing to save Paul; and he commanded those that could swim to throw themselves first out of the vessel; and the rest got planks, so that all of them came safe to shore. Then they found that the island was called *Melita* or *Malta*; the inhabitants of which received them with great humanity, (*Acts* xxvii. 1, 2, 3, &c.)

They being all very wet and cold, a great fire was lighted to dry them; and Paul having gathered up a handful of sticks, and put them upon the fire, a viper leaped out of the fire, and took hold of his hand. Then the barbarous people said to one another, "Without doubt this man is a murderer; and though he has been saved from the shipwreck, yet divine vengeance still pursues him, and will not suffer him to live." But Paul, shaking the viper into the fire, received no injury from it. The people, seeing this, changed their opinion of him, and took him for a god; which opinion of them was more confirmed, by his curing the father of Publius, the chief man of the island, of a fever and bloody flux. After this miracle, they all brought out their sick to him, and they were healed. See MELITA.

At the end of three months they embarked again; and arrived, first at Syracuse, then at Rhegium, and lastly at Puteoli. Here St Paul found some Christians, who detained him for seven days; then he set out for Rome. The brethren of this city, having been in-

Paul.

formed of St Paul's arrival, came out to meet him as far as Appii-forum, and the Three Taverns. And when he was come to Rome, he was allowed to dwell where he pleased, having a soldier to guard him, who was joined to him with a chain. Three days afterwards, St Paul called the chief of the Jews there to come to him. He related to them in what manner he had been seized in the temple of Jerusalem, and the necessity he was under of appealing to Cæsar. The Jews told him, that as yet they had received no information about his affair; and, as for Christianity, they knew nothing of it, but only that it was spoken against everywhere; however, that they should be very willing to have some account of that doctrine from him. A day was appointed for this purpose; when St Paul preached to them concerning the kingdom of God, endeavouring to convince them from Moses and the prophets, that Jesus was the Messiah. Some of them believed what he had said to them, while others disbelieved; so that they returned from him divided among themselves.

Paul dwelt for two whole years at Rome, from the year of Christ 61 to the year 63, in a lodging that he hired, where he received all that came to him, preaching the kingdom of God, and the religion of Jesus Christ, without any interruption.

Hitherto we have had the Acts of the Apostles for our guide, in compiling the history of St Paul; what we shall add hereafter, will be mostly taken from his own Epistles. His captivity did not a little contribute to the advancement of religion; for he converted several persons even of the emperor's court, (Phil. i. 12—18. and iv. 22.) The Christians of Philippi, in Macedonia, hearing that St Paul was a prisoner at Rome, sent Epaphroditus their bishop to him, to bring him money, and otherwise to assist him in their name, (Phil. ii. 25.) Epaphroditus fell sick at Rome; and when he went back to Macedonia, the apostle sent by him his Epistle to the Philippians.

It is not known by what means St Paul was delivered from his prison, and discharged from the accusation of the Jews. There is great probability that they durst not appear against him before the Emperor, as not having sufficient proof of what they laid to his charge. However that may be, it is certain that he was set at liberty, after having been two years a prisoner at Rome. He wrote also, during this imprisonment, his Epistles to Philemon and the Colossians.

He was still in the city Rome, or at least in Italy, when he wrote his Epistle to the Hebrews. St Paul, having got out of prison, went over Italy; and, according to some of the fathers, passed into Spain; then into Judea; went to Ephesus, and there left Timothy (Heb. xiii. 24. and 1 Tim. i. 3); preached in Crete, and there fixed Titus, to take care to cultivate the church he had planted in that place. Probably he might also visit the Philippians, according to the promise he had made them, (Phil. i. 23, 26. and ii. 24.); and it is believed, that it was from Macedonia that he wrote the First Epistle to Timothy.—Some time after, he wrote to Titus, whom he had left in Crete; he desires him to come to Nicopolis, from whence, probably, he sent this letter. The year following, that is, the 63th year of the Christian era, the apostle went into Asia, and came to Troas, (2 Tim.

iv. 13.) Thence he went to visit Timothy at Ephesus, and from thence to Miletus, (2 Tim. iv. 20.) Lastly, he went to Rome; and St Chrysostom says, that it was reported, that having converted a cup-bearer and a concubine of Nero, this so provoked the Emperor, that he caused St Paul to be apprehended, and clapped into prison. It was in this last place of confinement that he wrote his Second Epistle to Timothy, which Chrysostom looks upon as the apostle's last testament. See TIMOTHY and TITUS.

This great apostle at last consummated his martyrdom, the 29th of June, in the 66th year of Jesus Christ, by having his head cut off, at a place called the *Salvian Waters*. He was buried on the way of Ostium, and a magnificent church was built over his tomb, which is in being to this day. *Calmet's Dict.* &c.

PAUL (St), *Cave or Grotto of*, in the island of Malta, where St Paul and his company took shelter from the rains, when the viper fastened on his arm. Upon this spot there is a church built by the famed Alof de Vignacourt, grand-master of the order, in the year 1656, a very handsome, though but a small, structure. On the altar-piece is a curious painting, representing the apostle's shaking off the viper, surrounded with men, women, and children, in attitudes of admiration and surprise, and in the old Maltese garb; and the whole very well executed. On the top of the painting is the following inscription:

Vipera ignis acta calore frustra Pauli
Munus invadit; is insulse benedicens
Anguibus & herbis admittit omne virus.

M.DC.V.

PAUL, first bishop of Narbonne, or Sergius Paulus the proconsul, converted and made bishop by St Paul, was descended from one of the best families of Rome. It is said the apostle called himself *Paul*, from his name. The Spaniards will have him to be their apostle, which is not improbable; and it is said he died a martyr at Narbonne.

PAUL V. by birth a Roman, was first clerk of the chamber, and afterwards nuncio to Clement VIII. in Spain, who honoured him with a cardinal's hat. He was advanced to the papal chair the 16th of May 1605, after Leo XI. The ancient quarrel between the secular and ecclesiastical jurisdictions, which in former times had occasioned so much bloodshed, revived in the reign of this pontiff. The senate of Venice had condemned by two decrees, 1. The new foundations of monasteries made without their concurrence. 2. The alienation of the estates both ecclesiastical and secular. The first decree passed in 1603, and the second in 1605. About the same time a canon and abbot, accused of rapine and murder, were arrested by order of the senate, and delivered over to the secular court; a circumstance which could not fail to give offence to the court of Rome. Clement VIII. thought it proper to dissemble or take no notice of the affair; but Paul V. who had managed the Genoese upon a similar occasion, flattered himself with the hopes that the Venetians would be equally pliant. However, he was disappointed; for the senate maintained that they held their power to make laws of God only; and therefore they refused to revoke their decrees and deliver up the ecclesiastical.

Paul.

Paul. ecclesiastical prisoners into the hands of the nuncio, as the pope demanded. Paul, provoked at this behaviour, excommunicated the doge and senate; and threatened to put the whole state under an interdict, if satisfaction was not given him within the space of 24 hours. The senate did no more than protest against this menace, and forbid the publication of it throughout their dominions. A number of pamphlets, from both sides, soon announced the animosity of the two parties. The Capuchins, the Thealins, and Jesuits, were the only religious orders who observed the interdict. The senate shipped them all off for Rome, and the Jesuits were banished for ever. Meantime his holiness was preparing to make the refractory republic submit to his spiritual tyranny by force of arms. He levied troops against the Venetians; but he soon found his design balked, as the cause of the Venetians appeared to be the common cause of all princes. He had recourse, therefore, to Henry IV. to settle the differences; and this prince had all the honour of bringing about a reconciliation between the contending parties. His ambassadors at Rome and Venice began the negotiation, and Cardinal de Joyeuse finished it in 1607. It was agreed upon, that this cardinal should declare at his entry into the senate, that the censures of the church were to be taken off, or that he would remove them; and that the doge should at the same time surrender to him the deeds of revocation and protest. It was also stipulated, that all the religious who were banished, except the Jesuits, should be restored to their former privileges. In fine, the Venetians promised to send an ambassador extraordinary to Rome, in order to thank the pope for the favour he had done them; but they would not allow the legate to speak of his holiness granting them absolution. Paul was wise enough to overlook the whole matter, but endeavoured to put an end to another dispute, which had been long agitated in the congregations *de auxiliis*. He caused it to be intimated in form to the disputants and counsellors, that, as the congregations were now dissolved, it was his express order that the contending parties should no longer continue to censure one another. Some authors have affirmed that Paul V. had drawn out a bull against the doctrine of Molina, which only wanted to be promulged; but for this fact there appears to be no other evidence than the draught of this bull, which we meet with in the end of the history of the above mentioned congregations. Paul was strongly solicited, but in vain, to make the immaculate conception of the holy virgin an article of faith. He contented himself with barely forbidding the contrary doctrine to be publicly taught, that he might not offend the Dominicans, who, at that time, maintained that she was conceived, like other human creatures, in original sin. His holiness afterwards applied himself to the embellishing of Rome, and was at great pains to collect the works of the most eminent painters and engravers. Rome is indebted to him for its most beautiful fountains, especially that where the water spouts out from an antique vase taken from the thermal or hot-baths of Vespasian, and that which they call *acqua Paola*, an ancient work of Augustus, restored by Paul V. He brought water into it by an aqueduct 35 miles in length, after the example of Sixtus V. He completed the frontispiece of St Peter,

and the magnificent palace of Mount Cavallo. He applied himself in a particular manner to the recovering and repairing ancient monuments, which he made to advance, as much as the nature of them would admit, the honour of Christianity; as appears from an elegant inscription placed upon a column of porphyry, taken from the temple of Peace, and bearing a beautiful statue of the Virgin, at the side of the church of St Mary the elder:

“ Impura falsi templa
Quondam numinis
Jubente moesta perferebam Cæsare:
Nunc læta veri
Perferens matrem Dei
Te, Paule, nullis obticebo sæculis.”

His pontificate was honoured with several illustrious embassies. The kings of Japan, Congo, and other Indian princes, sent ambassadors to him. He took care to supply them with missionaries, and a round bishopricks in these countries newly brought over to the faith. He showed the same attention to the Maronites and other eastern Christians. He sent legates to different orthodox princes, both to rectify his stem for them, and to confirm them in their zeal for religion. He died the 28th of January 1621, aged 69; after having confirmed the French Oratory, the Ursulines, the Order of Charity, and some other institutions. Bold in his claims, but of narrow views, he distinguished himself more by his piety and knowledge than by his politics. It has been remarked, that he never passed a single day of his popedom without celebrating mass. He enjoined all the religious in the prosecution of their studies to have regular professors for Latin, Greek, Hebrew, and Arabic; if there were any among themselves properly qualified; or if that was not the case, to take the assistance of laymen for that purpose, until there were some of their own order who had learning enough to instruct their brethren. It was very difficult to carry this decree into execution; and indeed it was always very imperfectly observed.

PAUL (Father), whose name, before he entered into the monastic life, was Peter Sarpi, was born at Venice, August 14. 1552. His father followed merchandise, but with so little success, that at his death he left his family very ill provided for: but under the care of a mother whose piety was likely to bring the blessing of providence upon them, and whose wise conduct supplied the want of fortune by advantages of greater value. Happily for young Sarpi she had a brother, master of a celebrated school, under whose direction he was placed by her. Here he lost no time, but cultivated his abilities, naturally of the first rate, with unwearied application. He was born for study, having a natural aversion to pleasure and gaiety, and a memory so tenacious that he could repeat 30 verses upon once hearing them. Proportionable to his capacity was his progress in literature: at 13, having made himself master of school learning, he turned his studies to philosophy and the mathematics, and entered upon logic under Capella of Cremona, who, though a celebrated master of that science, confessed himself in a very little time unable to give his pupil any farther instructions.

Paul

As Capella was of the order of the Servites, his scholar was induced by his acquaintance with him to engage in the same profession, though his uncle and his mother represented to him the hardships and sufferings of that kind of life, and advised him with great earnestness against it. But he was steady in his resolution, and in 1506 took the habit of the order, being then only in his 14th year, a time of life in most persons very improper for such engagements, but in him attended with such maturity of thought, and such a settled temper, that he never seemed to regret the choice he then made, and which he confirmed by a solemn public profession in 1572.

At a general chapter of the Servites held at Mantua, Paul (and we shall now call him) being then only 20 years old, distinguished himself so much in a public disputation by his genius and learning, that William duke of Mantua, a great patron of letters, solicited the consent of his superiors to retain him at his court, and not only made him public professor of divinity in the cathedral, and reader of casuistical divinity and canon law in that city, but honoured him with many proofs of his esteem. But Father Paul finding a court life not agreeable to his temper, quitted it two years afterwards, and retired to his beloved privacy, being then not only acquainted with the Latin, Greek, Hebrew, and Chaldee languages, but with philosophy, the mathematics, canon and civil law, all parts of natural philosophy, and chemistry itself; for his application was unintermitted, his head clear, his apprehension quick, and his memory retentive.

Being made a priest at 22, he was distinguished by the illustrious Cardinal Borromeo with his confidence, and employed by him on many occasions, not without the envy of persons of less merit, who were so far exasperated as to lay a charge against him before the Inquisition, for denying that the Trinity could be proved from the first chapter of Genesis; but the accusation was too ridiculous to be taken notice of. After this he passed successively through the dignities of his order, of which he was chosen provincial for the province of Venice at 26 years of age; and discharged this post with such honour, that in 1579 he was appointed, with two others, to draw up new regulations and statutes for his order. This he executed with great success; and when his office of provincial was expired, he retired for three years to the study of natural and experimental philosophy and anatomy, in which he is said to have made some useful discoveries. In the intervals of his employment he applied himself to his studies with so extensive a capacity, as left no branch of knowledge untouched. By him Acquapendente, the great anatomist, confesses that he was informed how vision is performed; and there are proofs that he was not a stranger to the circulation of the blood. He frequently conversed upon astronomy with mathematicians, upon anatomy with surgeons, upon medicine with physicians, and with chemists upon the analysis of metals, not as a superficial inquirer, but as a complete master. He was then chosen procurator general of his order; and during his residence at Rome was greatly esteemed by Pope Sixtus V. and contracted an intimate friendship with Cardinal Bellarmine and other eminent persons.

But the hours of repose, that he employed so well,

were interrupted by a new information in the Inquisition; where a former acquaintance produced a letter written by him in cyphers, in which he said, "that he detested the court of Rome, and that no preferment was obtained there but by dishonest means." This accusation, however dangerous, was passed over on account of his great reputation; but made such impressions on that court, that he was afterwards denied a bishopric by Clement VIII. After these difficulties were surmounted, F. Paul again retired to his solitude; where he appears, by some writings drawn up by him at that time, to have turned his attention more to improvements in piety than learning. Such was the care with which he read the scriptures, that, it being his custom to draw a line under any passage which he intended more nicely to consider, there was not a single word in his New Testament but was underlined. The same marks of attention appeared in his Old Testament, Psalter, and Breviary.

But the most active scene of his life began about the year 1615; when Pope Paul V. exasperated by some decrees of the senate of Venice that interfered with the pretended rights of the church, laid the whole state under an interdict. The senate, filled with indignation at this treatment, forbade the bishops to receive or publish the pope's bull; and, convening the rectors of the churches, commanded them to celebrate divine service in the accustomed manner, with which most of them readily complied: but the Jesuits and some others refusing, were by a solemn edict expelled the state. Both parties having proceeded to extremities, employed their ablest writers to defend their measures. On the pope's side, among others, Cardinal Bellarmine entered the lists, and, with his confederate authors, defended the papal claims with great scurrility of expression, and very sophistical reasonings; which were confuted by the Venetian apologists in much more decent language, and with much greater solidity of argument. On this occasion F. Paul was most eminently distinguished by his Defence of the Rights of the supreme Magistrate, his Treatise of Excommunication, translated from Gerson, with an Apology, and other writings; for which he was cited before the Inquisition at Rome: but it may be easily imagined that he did not obey the summons.

The Venetian writers, whatever might be the abilities of their adversaries, were at least superior to them in the justice of their cause. The propositions maintained on the side of Rome were these: That the pope is invested with all the authority of heaven and earth: that all princes are his vassals, and that he may annul their laws at pleasure: that kings may appeal to him, as he is temporal monarch of the whole earth: that he can discharge subjects from their oaths of allegiance, and make it their duty to take up arms against their sovereign: that he may depose kings without any fault committed by them, if the good of the church requires it: that the clergy are exempt from all tribute to kings, and are not accountable to them even in cases of high-treason: that the pope cannot err: that his decisions are to be received and obeyed on pain of sin, though all the world should judge them to be false: that the pope is God upon earth: that his sentence and that of God are the same: and that to call his power in question is to call in question the power of God: maxims equally shocking,

weak,

Paul

Paul. weak, pernicious, and absurd; which did not require the abilities or learning of F. Paul to demonstrate their falshood and destructive tendency. It may be easily imagined that such principles were quickly overthrown, and that no court but that of Rome thought it for its interest to favour them. The pope, therefore, finding his authors confuted and his cause abandoned, was willing to conclude the affair by treaty; which, by the mediation of Henry IV. of France, was accommodated upon terms very much to the honour of the Venetians. But the defenders of the Venetian rights were, though comprehended in the treaty, excluded by the Romans from the benefit of it: some, upon different pretences, were imprisoned; some sent to the galleys; and all debarred from preferment. But their malice was chiefly aimed against F. Paul, who soon found the effects of it; for as he was going one night to his convent, about six months after the accommodation, he was attacked by five ruffians armed with stilettos, who gave him no less than fifteen stabs, three of which wounded him in such a manner that he was left for dead. The murderers fled for refuge to the nuncio, and were afterwards received into the pope's dominions; but were pursued by divine justice, and all, except one man who died in prison, perished by violent deaths.

This, and other attempts upon his life, obliged him to confine himself to his convent, where he engaged in writing the History of the Council of Trent; a work unequalled for the judicious disposition of the matter, and artful texture of the narration; commended by Dr Burnet as the completest model of historical writing; and celebrated by Mr Wotton as equivalent to any production of antiquity; in which the reader finds "liberty without licentiousness, piety without hypocrisy, freedom of speech without neglect of decency, severity without rigour, and extensive learning without ostentation."

In this, and other works of less consequence, he spent the remaining part of his life to the beginning of the year 1622, when he was seized with a cold and fever, which he neglected till it became incurable. He languished more than twelve months, which he spent almost wholly in a preparation for his passage into eternity; and among his prayers and aspirations was often heard to repeat, "Lord! now let thy servant depart in peace." On Sunday the eighth of January of the next year, he rose, weak as he was, to mass, and went to take his repast with the rest; but on Monday was seized with a weakness that threatened immediate death; and on Thursday prepared for his change, by receiving the viaticum, with such marks of devotion as equally melted and edified the beholders. Through the whole course of his illness to the last hour of his life he was consulted by the senate in public affairs, and returned answers in his greatest weakness with such presence of mind as could only arise from the consciousness of innocence.

On Saturday, the day of his death, he had the passion of our blessed Saviour read to him out of St John's gospel, as on every other day of that week, and spoke of the mercy of his Redeemer, and his confidence in his merits. As his end evidently approached, the brethren of his convent came to pronounce the last prayers, with which he could only join in his thoughts,

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being able to pronounce no more than these words, *Esso perpetua*, "Mayest thou last for ever;" which was understood to be a prayer for the prosperity of his country. Thus died F. Paul, in the 71st year of his age; hated by the Romans as their most formidable enemy, and honoured by all the learned for his abilities, and by the good for his integrity. His detestation of the corruption of the Roman church appears in all his writings, but particularly in this memorable passage of one of his letters: "There is nothing more essential than to ruin the reputation of the Jesuits. By the ruin of the Jesuits, Rome will be ruined; and if Rome is ruined, religion will reform of itself." He appears, by many passages in his life, to have had a high esteem for the church of England; and his friend F. Fulgentio, who had adopted all his notions, made no scruple of admitting to Dr Duncombe, an English gentleman that fell sick at Venice, the communion in both kinds, according to the Common Prayer which he had with him in Italian. He was buried with great pomp at the public charge, and a magnificent monument was erected to his memorial.

PAUL, in sea language, is a short bar of wood or iron, fixed close to the capstern or windlass of a ship, to prevent those engines from rolling back or giving way when they are employed to heave in the cable, or otherwise charged with any great effort.

PAULIANISTS, PAULIANISTÆ, a sect of heretics, so called from their founder Paulus Samosatensis, a native of Samosata, elected bishop of Antioch in 262. His doctrine seems to have amounted to this: that the Son and the Holy Ghost exist in God in the same manner as the faculties of reason and activity do in man; that Christ was born a mere man; but that the reason or wisdom of the Father descended into him, and by him wrought miracles upon earth, and instructed the nations; and, finally, that, on account of this union of the Divine Word with the man Jesus, Christ might, though improperly, be called God. It is also said, that he did not baptize in the name of the Father and the Son, &c.; for which reason the council of Nice ordered those baptized by him to be re-baptized.

Being condemned by Dionysius Alexandrinus in a council, he abjured his errors, to avoid deposition; but soon after he resumed them, and was actually deposed by another council in 269. — He may be considered as the father of the modern Socinians; and his errors are severely condemned by the council of Nice, whose creed differs a little from that now used, under the same name, in the church of England. The creed agreed upon by the Nicene fathers, with a view to the errors of Paulus Samosatensis, concludes thus:

τοῦ θεοῦ ἀληθινὸς καὶ ἀποστολικὸς καὶ κατὰ τὴν διδασκαλίαν, οὐκ ἔστι, &c.

"But those who say there was a time when he was not, and that he was not before he was born, the catholic and apostolic church anathematizes." To those who have any veneration for the council of Nice this must appear a very severe, and perhaps not unjust, censure of some other modern sects as well as of the Socinians.

PAULICIANS, a branch of the ancient Manichees, so called from their founder, one Paulus, an Armenian, in the seventh century; who, with his brother John, both of Samosata, formed this sect: though others

Paul
Paulianists.

Paulicians are of opinion, that they were thus called from another Paul, an Armenian by birth, who lived under the reign of Justinian II. In the seventh century a zealot called Constantine revived this drooping sect, which had suffered much from the violence of its adversaries, and was ready to expire under the severity of the imperial edicts, and that zeal with which they were carried into execution. The Paulicians, however, by their number, and the continuance of the emperor Nicephorus, became formidable to all the East.

But the cruel rage of persecution, which had for some years been suspended, broke forth with redoubled violence under the reigns of Michael Curopalates and Leo the Armenian, who inflicted capital punishment on such of the Paulicians as refused to return into the bosom of the church. The empress Theodora, tutors of the Emperor Michael, in 845, would oblige them either to be converted or to quit the empire: upon which several of them were put to death, and more retired among the Saracens; but they were neither all exterminated nor banished.

Upon this they entered into a league with the Saracens; and choosing for their chief an officer of the greatest resolution and valour, whose name was Carbeas, they declared against the Greeks a war which was carried on for fifty years with the greatest vehemence and fury. During these commotions, some Paulicians, towards the conclusion of this century, spread abroad their doctrines among the Bulgarians; many of them, either from a principle of zeal for the propagation of their opinions, or from a natural desire of flying from the persecution which they suffered under the Grecian yoke, retired, about the close of the eleventh century, from Bulgaria and Thrace, and formed settlements in other countries. Their first migration was into Italy; whence, in process of time, they sent colonies into almost all the other provinces of Europe, and formed gradually a considerable number of religious assemblies, who adhered to their doctrine, and who were afterwards persecuted with the utmost vehemence by the Roman pontiffs. In Italy they were called *Patariini*, from a certain place called *Pataria*, being a part of the city of Milan, where they held their assemblies; and *Gathari* or *Gazari*, from *Gazaria*, or the Lesser Tartary. In France they were called *Albigenses*, though their faith differed widely from that of the Albigenses whom Protestant writers generally vindicate. (See **ALBIGENSES**). The first religious assembly the Paulicians had formed in Europe is said to have been discovered at Orleans in 1017, under the reign of Robert, when many of them were condemned to be burnt alive. The ancient Paulicians, according to Photius, expressed the utmost abhorrence of Manes and his doctrine. The Greek writers comprise their errors under the six following particulars: 1. They denied that this inferior and visible world is the production of the supreme Being; and they distinguish the Creator of the world and of human bodies from the most high God who dwells in the heavens: and hence some have been led to conceive that they were a branch of the Gnostics rather than of the Manichæans. 2. They treated contemptuously the Virgin Mary; or, according to the usual manner of speaking among the Greeks, they refused to adore and worship her. 3. They refused to celebrate the institution of the Lord's supper. 4. They

loaded the cross of Christ with contempt and reproach; by which we are only to understand, that they refused to follow the absurd and superstitious practice of the Greeks, who paid to the pretended wood of the cross a certain sort of religious homage. 5. They rejected, after the example of the greatest part of the Gnostics, the books of the Old Testament; and looked upon the writers of that sacred history as inspired by the Creator of this world, and not by the supreme God. 6. They excluded presbyters and elders from all part in the administration of the church.

PAULINA, a Roman lady, wife of Saturnius governor of Syria, in the reign of the Emperor Tiberius. Her conjugal peace was disturbed, and violence was offered to her virtue, by a young man named Mundus, who fell in love with her, and had caused her to come to the temple of Isis by means of the priests of that goddess, who declared that Anubis wished to communicate to her something of moment. Saturnius complained to the emperor of the violence which had been offered to his wife; and the temple of Isis was overturned, and Mundus banished, &c.—There was besides a *Paulina*, wife of the philosopher Seneca. She attempted to kill herself when Nero had ordered her husband to die. The emperor, however, prevented her; and she lived some few years after in the greatest melancholy.

PAULINIA, in botany: A genus of the trigynia order, belonging to the octandria class of plants; and in the natural method ranking under the 23d order, *Tribilatae*. Its characters are these: the flowers has a permanent empalement, composed of four small oval leaves; it has four oblong oval petals, twice the size of the empalement: and eight short stamina with a turbinate germen, having three short slender styles, crowned by spreading stigmas; the germin turns to a large three-cornered capsule with three cells, each containing one almost oval seed. Linnæus reckons seven, and Miller nine, species, natives of the West Indies.

PAULINUS, a bishop who flourished in the early part of the 7th century. He was the apostle of Yorkshire, having been the first archbishop of York. This dignity seems to have been conferred on him about the year 626. He built a church at Almonbury, and dedicated it to St Alban, where he preached to and converted the Brigantes. Camden mentions a cross at Dewsborough, which had been erected to him with this inscription, *Paulinus hic predicavit et celebravit*. York was so small about this time, that there was not so much as a small church in it in which King Edwin could be baptized. Constantius is said to have made it a bishopric. Pope Honorius made it a metropolitan see. We are told that Paulinus baptized in the river Swale, in one day, 10,000 men, besides women and children, on the first conversion of the Saxons to Christianity, besides many at Halystone. At Walfone, in Northumberland, he baptized Segbert king of the East Saxons. Bede says, "Paulinus coming with the king and queen to the royal manor called *Ad-Gebrin* (now Yeverin), staid there 36 days with them, employed in the duties of catechizing and baptizing. In all this time he did nothing from morning to night but instruct the people, who flocked to him from all the villages and places, in the doctrine of Christ and salvation; and, after they were instructed, baptizing them

Paulina
||
Paulinus

them in the neighbouring river Glen." According to the same Bede, "he preached the word in the province of Lindissi; and first converted the governor of the city of Lindisbina, whose name was Blaca, with all his family. In this city he built a stone church of exquisite workmanship, whose roof being ruined by long neglect or the violence of the enemy, only the walls are now standing." He is also said to have founded a collegiate church of prebends near Southwell, in Nottinghamshire, dedicated to the Virgin Mary. This church he is said to have built when he baptized the Coritani in the Trent.

PAULO (Marco), a celebrated traveller, was son to Nicholas Paulo, a Venecian, who went with his brother Matthew, about the year 1255, to Constantinople, in the reign of Baudouin II. Nicholas, at his departure, left his wife big with child; and she brought to the world the famous Marco Paulo, the subject of this memoir. The two Venetians, having taken leave of the emperor, crossed the Black Sea, and travelled into Armenia; whence they passed over land to the court of Barka, one of the greatest lords of Tartary, who loaded them with honours. This prince having been defeated by one of his neighbours, Nicholas and Matthew made the best of their way through the deserts, and arrived at the city where Kublai, grand khan of the Tartars, resided. Ku' lai was entertained with the account which they gave him of the European manners and customs; and appointed them ambassadors to the pope, in order to demand of his holiness a hundred missionaries. They came accordingly to Italy, obtained from the Roman pontiff two Dominicans, the one an Italian the other an Asiatic, and carried along with them young Marco, for whom Kublai expressed a singular affection. This young man, having learned the different dialects of Tartary, was employed in embassies which gave him the opportunity of traversing Tartary, China, and other eastern countries. At length, after a residence of seventeen years at the court of the grand khan, the three Venetians returned to their own country, in the year 1295, with immense fortunes. A short time after his return, Marco serving his country at sea against the Genoese, his galley, in a great naval engagement, was sunk, and himself taken prisoner, and carried to Genoa. He remained there many years in confinement; and, as well to amuse his melancholy as to gratify those who desired it from him, he sent for his notes from Venice, and composed the history of his own and his father's voyages in Italian, under this title, *Delle maraviglie del mondo da lui vidute*, &c.; the first edition of which appeared at Venice, in 8vo, 1496. His work was translated into different languages, and inserted in various collections. The editions most esteemed are the Latin one published by Andrew Muller at Cologne, in 4to, 1671; and that in French, to be found in the collection of voyages published by Bergeron, at the Hague, 1737, in 2 vols 4to. In the writings of Marco Paulo, there are some things true and others highly incredible. It is indeed difficult to believe, that as soon as the grand khan was informed of the arrival of two Venetian merchants, who were come to sell theriaca (or treacle) at his court, he sent before them an escort of 40,000 men, and afterwards dispatched these Venetian ambassadors to the Pope, to beseech his holiness to send

him a hundred missionaries. It is equally difficult to believe that the pope, who doubtless had an ardent zeal for the propagation of the faith, instead of a hundred, should have sent him only two missionaries. There are therefore some errors and exaggerations in Marco Paulo's narrative; but many other things which were afterward verified, and which have been of service to succeeding travellers, prove that in several respects his relation is valuable. He not only gave better accounts of China than had been before received; but likewise furnished a description of Japan, of many of the islands of the East Indies, of Madagascar, and the coasts of Africa; so that from his work it might be easily collected, that a direct passage by sea to the Indies was not only possible, but practicable. It may be worth while to add, that in the opinion of the authors of the Universal History, what he wrote from his own knowledge is both curious and true. To that where he has erred his father and uncle must have deceived him.

PAULUS ÆMILIUS. See *Æmilius Paulus*.

PAVO, the PEACOCK, in ornithology; a genus belonging to the order of gallinæ. The head is covered with feathers which bend backwards; the feathers of the tail are very long, and beautifully variegated with eyes of different colours. Latham enumerates eight species:

1. The cristatus, or common peacock of English authors, has a compressed crest and solitary spurs.—It is about the size of a common turkey; the length from the tip of the bill to the end of the tail being three feet eight inches. The bill is nearly two inches long, and is of a brown colour. The irides are yellow. On the crown there is a sort of crest, composed of 24 feathers, which are not webbed except at the ends, which are gilded green. The shafts are of a whitish colour; and the head, neck, and breast, are of a green gold colour. Over the eye there is a streak of white, and beneath there is the same. The back and rump are of a green gold colour, glossed over with copper; the feathers are distinct, and lie over each other like shells. "Above the tail springs an inimitable set of long beautiful feathers, adorned with a variegated eye at the end of each; these reach considerably beyond the tail; and the longest of them in many birds are four feet and a half in length. This beautiful train, or tail as it is falsely called, may be expanded quite to a perpendicular upwards at the will of the bird. The true tail is hid beneath this group of feathers, and consists of 18 grey brown feathers, one foot and a half long, marked on the sides with rufous grey: the scapulars and lesser wing coverts are reddish cream-colour, variegated with black: the middle coverts deep blue, glossed with green gold: the greatest and bastard wing rufous: the quills are also rufous; some of them variegated with rufous, blackish, and green: the belly and vent are greenish black: the thighs yellowish: the legs stout; those of the male furnished with a strong spur three quarters of an inch in length; the colour of them grey brown."

The female is rather less than the male. The train is very short, being much shorter than the tail, and scarcely longer than its coverts; neither are the feathers furnished with eyes. The crest on the head is similar to that on the head of the male: the sides of the head have a greater portion of white: the throat and neck

Paulus,

Pavo.

Latham's
Synopsis of
Birds.

are green : the rest of the body and wings are cinereous brown : the breast is fringed with white : the bill is the same : the irides are lead-colour : the legs are as in the male ; but the spur is generally wanting, though in some birds a rudiment of one is seen. In some male birds, all the wing coverts and scapulars are of a fine deep blue green, very glossy ; but the outer edge of the wing and quills are of the common colour.

This bird, now so common in Europe, is of eastern origin, being a native of India. They are found wild in the islands of Ceylon and Java in the East Indies, and at St Helena, at Barbuda, and other West India islands. They are not natural to China ; but they are found in many places of Asia and Africa. They are, however, nowhere so large or so fine as in India, in the neighbourhood of the Ganges, from whence, by degrees, they have spread into all parts, increasing in a wild state in the warmer climes ; but wanting some care in the colder regions. In ours, this bird does not come to its full plumage till the third year. The female lays five or six greyish white eggs ; in hot climates 20, the size of those of a turkey. These, if let alone, she lays in some secret place, at a distance from the usual resort, to prevent their being broken by the male, which he is apt to do if he find them. The time of sitting is from 27 to 30 days. The young may be fed with curd, chopped leeks, barley-meal, &c. moistened ; and are fond of grasshoppers, and some other insects. In five or six months they will feed as the old ones, on wheat and barley, with what else they can pick up in the circuit of their confinement. They seem to prefer the most elevated places to roost on during night ; such as high trees, tops of houses, and the like. Their cry is loud and inharmonious ; a perfect contrast to their external beauty. They are caught in India, by carrying lights to the trees where they roost, and having painted representations of the bird presented to them at the same time ; when they put out the neck to look at the figure, the sportsman slips a noose over the head, and secures his game (A). In most ages they have been esteemed as a salutary food. Hortensius gave the example at Rome, where it was carried to the highest luxury, and sold dear (B) : and a young pea-fowl is thought a dainty even in the present times.

The life of this bird is reckoned by some at about 25 years ; by others 100.

2. The variegated peacock, is nothing else but a mixed breed between the common and white peacock ; and of course varies very considerably in colour.

3. The white peacock is, as its name imports, entirely white, not excepting even the eyes of the train, which it is nevertheless easy to trace out. This variety is in Latham's opinion more common in England than elsewhere. We are informed by the same author, that two instances have occurred to him of the

females of this species having the external marks of the plumage of the male.

4. The pavo muticus is about the size of the crested peacock ; but the bill is larger and ash-coloured : the irides are yellow, and round the eyes is red ; on the top of the head is an upright crest four inches long, and shaped somewhat like an ear of corn. The colour is green mixed with blue. The top of the neck and head are greenish, marked with spots of blue, which have a streak of white down the middle of each : the back is greenish blue : the breast is blue and green gold mixed : the belly, sides, and thighs are ash-colour, marked with black spots, streaked with white on the belly : the wing coverts and secondaries are not unlike the back : the greater quills are green, transversely barred with black lines, but growing yellowish towards the ends, where they are black : the upper tail coverts are fewer than those of the common peacock, but much longer than the tail ; they are of a chestnut brown, with white shafts, and have at the end of each a large spot gilded in the middle, then blue, and surrounded with green : the legs are ash-coloured, and not furnished with spurs, or they have been overlooked by those who have seen them.

The female is smaller than the male ; and differs in having the belly quite black, and the upper tail coverts much shorter : the tail is green, edged with blue, and white shafts. It inhabits Japan, and is only known to Europe by means of a painting, sent by the emperor of Japan to the pope.

So beautiful a species of birds as the peacock could not long remain a stranger in the more distant parts in which they were produced ; for so early as the days of Solomon, we find, among the articles imported in his Turkish navies, apes and peacocks. A monarch so conversant in all branches of natural history, "who spoke of trees, from the cedar of Lebanon, even unto the hyssop that springeth out of the wall ; who spoke also of beasts and of fowl," would certainly not neglect furnishing his officers with instructions for collecting every curiosity in the countries they voyaged to, which gave him a knowledge that distinguished him from all the princes of his time. Ælian relates, that they were brought into Greece from some barbarous country ; and that they were held in such high esteem, that a male and female were valued at Athens at 1000 drachmæ, or 32 l. 5 s. 10 d. Their next step might be to Samos ; where they were preserved about the temple of Juno, being the birds sacred to that goddess ; and Gellius, in his *Notes Atticæ*, c. 16. commends the excellency of the Samian peacocks. It is therefore probable, that they were brought there originally for the purposes of superstition, and afterwards cultivated for the uses of luxury. We are also told, when Alexander was in India, he found

(A) Tavernier's Travels, vol. iii. p. 57. The inhabitants of the mountains on both sides of the Ganges catch them with a birdlime, prepared from the milky juice of two sorts of trees (*Sicus religiosa* & *Indica*.—L. n.), boiled with oils into a confluence ; which proves sufficiently tenacious to entangle them, or the largest birds.—*Phil. Trans.* vol. lxxi. p. 376.

(B) They must have been in plenty notwithstanding, or the Emperor Vitellius could not have got sufficient for his large dish, called the *Buckler of Minerva*, which, history says, was filled with the livers of peacocks, tongues of flamingoes, and brains of pheasants and peacocks.

found vast numbers of wild ones on the banks of the Hyarotis; and was so struck with their beauty, as to appoint a severe punishment on any person that killed them.

Peacocks crests, in ancient times, were among the ornaments of the kings of England. Ernauld de Acquent was fined to king John in 140 palfries, with sackbuts, lorains, gilt spurs, and peacocks crests, such as would be for his credit. See Plate CCCLXXXI.

5. The pavo bicalcaratus, is larger than the common pheasant. The bill is black, but from the nostrils to the tip of the upper mandible red. The irides are yellow. The feathers on the crown of the head are sufficiently long to form a crest, of a dull brown colour. The space between the bill and eyes is naked, with a few scattered hairs: the sides of the head are white: the neck is bright brown, striated across with dusky brown: the upper parts of the back, scapulars, and wing coverts, are dull brown, dotted with paler brown and yellowish; besides which, each feather is marked near the end with a roundish large spot of a gilded purple colour, changing into blue and green in different lights: the lower part of the back and rump are dotted with white: all the under parts are brown, striated transversely with black: the quills are dusky; the secondaries are marked with the same spot as the rest of the wing: the upper tail coverts are longer than the tail, and each marked at the end with a spot like the wing feathers, each of which is surrounded first with a circle of black, and ultimately with an orange one: the legs and claws are brown, and on the back part of each leg are two spurs, one above the other.

The female is a third smaller than the male. The head, neck, and under parts are brown; the head smooth: the upper parts are also brown, and the feathers marked with a dull blue spot, surrounded with dirty orange: the feathers which cover the tail are similar; but marked at the end with an obscure dull oval spot of blue: the legs have no spurs.

This species is of Chinese origin, and some of them have been brought from China to England alive, and have been for some time in the possession of Dr James Munro. The male is now in the Leverian Museum, in the finest preservation.

Sonnerat observes, that the bird from whence his description was taken had two spurs on one leg, and three on the other. This must surely be a *lusus nature*; especially as he says, it is the same as that in *Edw.* pl. 67.

6. The pavo tibetanus, is about the size of a pinta-don, being about two feet and nearly two inches long. The bill is above an inch and a half long, and cinereous: the irides are yellow: the head, neck, and under parts are ash coloured, marked with blackish lines: the wing coverts, back, and rump, are grey, with small white dots; besides which, on the wing coverts and back are large round spots of a fine blue, changing in different lights to violet and green gold: the quills and upper tail coverts are also grey, marked with blackish lines; the quills have two round blue spots on each, like those of the coverts; on the outer webs, and on each tail feather, there are four of the same, two on each side the web; the middle coverts are the longest, the others shorten by degrees: the legs are grey, sur-

nished with two spurs behind, like the last species: the claws are blackish. This species inhabits the kingdom of Thibet. The Chinese give it the name of *Chin-tchien-Khi*.

PAVO, in ichthyology. See *Pescocyclyb*.

PAVO, in astronomy, a constellation in the southern hemisphere, unknown to the ancients, and not visible in our latitude. It consists of 14 stars, of which the names and situations are as follow:

	Declin.	Longitud.	Latitude South.	Magnitude
The eye of the peacock	15	0 0 34 6	11 18	2
In the breast		24 41 51 46	55 21	3
In the right wing		18 41 30 45	52 34	3
In the middle		3 42 38 44	29 8	3
In the root of the tail, first		5 53 22 44	6 13	5
5.				
second		2 42 11 41	37 9	5
third		3 55 22 37	3 23	4
fourth		5 11 33 37	10 46	6
fifth		0 49 34 37	54 14	5
sixth	7	29 39 17 38	3 36	4
10.				
seventh		27 22 54 40	9 28	5
last		24 7 44 41	28 2	4
In the right foot	15	1 22 11 48	6 3	4
In the left foot		9 43 75 49	7 4	

See ASTRONOMY, n° 406.

PAVOR, a Roman deity, whose worship was introduced by Tullus Hostilius, who, in a panic, vowed a shrine to him, and one to Pallor, *Palenesis*; and therefore they are found on the coins of that family.

PAURÆDASTYLÆ, in natural history, the name of a genus of perfect crystals with double pyramids, and no intermediate column, composed of 12 planes, or two hexangular pyramids joined base to base.

PAUSANIA, in Grecian antiquity, a festival in which were solemn games, wherein nobody contended but free-born Spartans; in honour of Pausanias the Spartan general, under whom the Greeks overcame the Persians in the famous battle of Platæa.

PAUSANIAS, a Spartan king and general, who signalized himself at the battle of Platæa against the Persians. The Greeks, very sensible of his services, rewarded his merit with a tenth of the spoils taken from the Persians. He was afterwards appointed to command the Spartan armies, and he extended his conquests in Asia; but the haughtiness of his behaviour created him many enemies; and the Athenians soon obtained a superiority in the affairs of Greece.—Pausanias, dissatisfied with his countrymen, offered to betray Greece to the Persians, if he received in marriage as the reward of his perfidy the daughter of their king. His intrigues were discovered by means of a young man who was intrusted with his letters to Persia, and who refused to go, on recollecting that such as had been employed in that office before, had never returned. The letters were given to the Ephori of Sparta, and the perfidy of Pausanias was thus discovered. He fled for safety to a temple of Minerva; and as the sanctity of the place secured him from the violence

Pavo
II
Pausanias.

Pausanias
||
Peace.

of his pursuers, the sacred building was surrounded with heaps of stones, the first of which was carried there by the indignant mother of the unhappy man. He was starved to death in the temple, and died about 474 years before the Christian era. There was a festival and solemn games instituted to his honour, in which only free-born Spartans contended. There was also an oration spoken in his praise, in which his actions were celebrated, particularly the battle of Platæa, and the defeat of Marlonius. See PAUSANIA.

PAUSANIAS, a learned Greek historian and orator, in the second century, under the reign of Antoninus the philosopher, was the disciple of Herodotus Atticus. He lived for a long time in Greece; and afterwards went to Rome, where he died at a great age. He wrote an excellent description of Greece, in ten books; in which we find not only the situation of places, but the antiquities of Greece, and every thing most curious and worthy of knowledge. Abbe Goulin has given a French translation of it, in 2 vols 4to.

PAUSE, a stop or cessation in speaking, singing, playing, or the like. One use of pointing in grammar is to make proper pauses, in certain places.—There is a pause in the middle of each verse; in an hemistich, it is called a *rest* or *repose*. See POETRY, and READING.

PAW, in the manege. A horse is said to paw the ground, when, his leg being either tired or painful, he does not rest it upon the ground, and fears to hurt himself as he walks.

PAWN, a pledge or gage for surety of payment of money lent. It is said to be derived *a pugno, quia res que pignori dantur, pugno vel manu traduntur*. The party that pawns goods hath a general property in them; they cannot be forfeited by the party that hath them in pawn for any offence of his, nor be taken in execution for his debt; neither may they otherwise be put in execution till the debt for which they are pawned is satisfied.

If the pawn is laid up, and the pawnee robbed, he is not answerable; though if the pawnee use the thing, as a jewel, watch, &c. that will not be the worse for wearing, which he may do, it is at his peril; and if he is robbed, he is answerable to the owner, as the using occasioned the loss, &c.

If the pawn is of such a nature that the keeping is a charge to the pawnee, as a cow or a horse, &c. he may milk the one and ride the other, and this shall go in recompence for his keeping.

Things which will grow the worse by using, as apparel, &c. he may not use.

PEA, in botany. See PISUM.

PEACE (*Temple of*), a celebrated temple at Rome, which was consumed by fire A. D. 191; produced, as some writers suppose, by a slight earthquake, for no thunder was heard at the time. Dio Cassius, however, supposes that it began in the adjoining houses. Be that as it will, the temple, with all the surrounding buildings, were reduced to ashes. That magnificent structure had been raised by Vespasian after the destruction of Jerusalem, and enriched with the spoils and ornaments of the temple of the Jews. The ancients speak of it as one of the most stately buildings in Rome. There men of learning used to hold their assemblies,

and lodge their writings, as many others deposited their jewels, and whatever else they esteemed of great value. It was likewise made use of as a kind of magazine for the spices that were brought by the Roman merchants out of Egypt and Arabia; so that many rich persons were reduced to beggary, all their valuable effects and treasures being consumed in one night, with the temple.

PEACH, in botany. See AMYGDALUS.

PEACOCK, in ornithology. See PAVO.

PEACOCK-Fish. *Pinna ani radiis 55, caudali falcata.* The body of this fish is of various colours; the fin of the anus has 55 streaks, and its tail is in the form of a crescent. The head is without scales; it is brown upon the upper part, yellow above the eyes, and of a silver colour on the sides. The back is round, and adorned with beautiful blue streaks in a serpentine form; and the belly bright as silver. The fins of the breast are round, and, like those of the belly, have a yellow ground with a grey border; that of the back is of a violet colour; that of the anus is straw coloured; and, lastly, that of the tail is yellow on the sides, red towards the middle, and bordered with a deep blue. We are as yet ignorant of its length.

There is a variety of this fish found only in the Indian seas, and therefore called the *Indian peacock fish*; which is thus described in the language of Linnæus: *Pavo pinna caudali forcipata: spinis dorsibus 14: oculo cæruleo pone oculos*. It has the fin of its tail forked; 14 sharp points or prickles on the back, with a round blue streak behind the eyes.

The body of this fish is of an elliptical form; the head is covered with scales to the tip of the snout; the two jaws are armed with long and sharp teeth; the ball of the eye is black, and the iris of a white colour, with a mixture of green. At the insertion of the fins of the belly is found a bony substance. The head, back, and sides, are of a yellow colour, more or less deep, and covered with lines or streaks of sky blue. These colours are so agreeably mixed, that they resemble the elegance of the peacock's tail.

PEAK OF DERBYSHIRE, a chain of very high mountains in the county of Derby in England, famous for the mines they contain, and for their remarkable caverns. The most remarkable of these are Pool's-hole and Elden-hole. The former is a cave at the foot of a high hill called *Coilmose*, so narrow at the entrance that passengers are obliged to creep on all-fours; but it soon opens to a considerable height, extending to above a quarter of a mile, with a roof somewhat resembling that of an ancient cathedral. By the petrifying water continually dropping in many parts of the cave are formed a variety of curious figures and representations of the works both of nature and art. There is a column here as clear as alabaster, which is called *The Queen of Scots Pillar*, because Queen Mary is said to have proceeded thus far when she visited the cavern. It seems the curiosity of that princess had led her thus far into this dark abode; and indeed there are few travellers who care to venture farther; but others, determined to see the end of all, have gone beyond it. After sliding down the rock a little way, is found the dreary cavity turned upwards: following its course, and climbing from crag to crag, the traveller arrives at a great height, till the rock, closing over his head

Peack
||
Peak.

on all sides, puts an end to any further subterraneous journey. Just at turning to descend, the attention is caught by a chasm, in which is seen a candle glimmering at a vast depth underneath. The guides say, that the light is at a place near Mary Queen of Scots pillar, and no less than 80 yards below. It appears frightfully deep indeed to look down; but perhaps does not measure any thing like what it is said to do. If a pistol is fired by the Queen of Scots pillar, it will make a report as loud as a cannon. Near the extremity there is a hollow in the roof, called the *Needle's Eye*; in which if a candle is placed, it will represent a star in the firmament to those who are below. At a little distance from this cave is a small clear stream consisting of hot and cold water, so near each other, that the finger and thumb of the same hand may be put, the one into the hot water and the other into the cold.

Elden-hole is a dreadful chasm in the side of a mountain; which, before the latter part of the last century, was thought to be altogether unfathomable. In the time of Queen Elizabeth, a poor man was let down into it for 200 yards; but he was drawn up in a frenzy, and soon after died. In 1682, it was examined by Captain Collins, and in 1699 by Captain Sturmy, who published their accounts in the Philosophical Transactions. The latter descended by ropes fixed at the top of an old lead-ore pit, four fathoms almost perpendicular, and from thence three fathoms more obliquely; between two great rocks. At the bottom of this he found an entrance into a very spacious cavern, from whence he descended along with a miner for 25 fathoms perpendicular. At last they came to a great river or water, which he found to be 20 fathoms broad and eight fathoms deep. The miner who accompanied him, insisted that this water ebbed and flowed with the sea; but the Captain disproved this assertion, by remaining in the place from three hours flood to two hours ebb, during which time there was no alteration in the height of the water. As they walked by the side of this water, they observed a hollow in the rock some feet above them. The miner went into this place, which was the mouth of another cavern; and walked for about 70 paces in it, till he just lost sight of the Captain. He then called to him, that he had found a rich mine; but immediately after came running out and crying, that he had seen an evil spirit; neither could any persuasions induce him to return. The floor of these caverns is a kind of white stone enamelled with lead ore, and the roofs are encrusted with shining spar. On his return from this subterraneous journey, Captain Sturmy was seized with a violent headach, which, after continuing four days, terminated in a fever, of which he died in a short time.

Several years ago this cavern was visited by the late Mr James Ferguson: who tells us, that it consists of two hollows one over another; but that the mouth of the lowermost is now stopped up by planks of timber laid across it, on which is a heap of stones thrown in at the upper mouth with a design to fill up the cavern entirely; which, however, will probably be never accomplished on account of its vast size.

PEARL of TERROR. See TERROR.

PEAN, in heraldry, is when the field of a coat of arms is sable, and the powderings or.

PEAR, in botany. See PYRUS.

PEAR-Glass. See *VITREA Lacryma*.

PEARCE (Dr), lord bishop of Rochester, was the son of a distiller in High Holborn. He married Miss Adams, the daughter of a distiller in the same neighbourhood, with a considerable fortune, who lived with him 52 years in the highest degree of connubial happiness. He had his education in Westminster school, where he was distinguished by his merit, and elected one of the king's scholars. In 1710, when he was 20 years old, he was elected to Trinity College, Cambridge. During the first years of his residence at the university, he sometimes amused himself with lighter compositions, some of which are inserted in the *Guardian* and *Spectator*. In 1716, he published his edition of *Cicero de Oratore*, and, at the desire of a friend, luckily dedicated it to Lord Chief Justice Parker (afterwards Earl of Macclesfield), to whom he was a stranger. This incident laid the foundation of his future fortune; for Lord Parker soon recommended him to Dr Bentley, master of Trinity, to be made one of the fellows; and the doctor consented to it on this condition, that his lordship would promise to *unmake* him again as soon as it lay in his power to give him a living. In 1717, Mr Pearce was ordained at the age of 27; having taken time enough, as he thought, to attain a sufficient knowledge of the sacred office. In 1718, Lord Parker was appointed chancellor, and invited Mr Pearce to live with him in his house as chaplain. In 1719, he was instituted into the rectory of Stapleford Abbots, in Essex; and in 1720, into that of St Bartholomew, behind the Royal Exchange, worth 400 l. *per annum*. In 1723, the lord chancellor presented him to St Martin's in the Fields. His Majesty, who was then at Hanover, was applied to in favour of St Claget, who was then along with him; and the doctor actually kissed hands upon the occasion: but the chancellor, upon the king's return, disputed the point, and was permitted to present Mr Pearce.—Mr Pearce soon attracted the notice and esteem of persons in the highest stations and of the greatest abilities. Beside Lord Parker, he could reckon amongst his patrons or friends, Lord Macclesfield, Mr Pulteney (afterwards Earl of Bath), archbishop Potter, Lord Hardwicke, Sir Isaac Newton, and other illustrious personages.—In 1724, the degree of doctor of divinity was conferred on him by archbishop Wake. The same year he dedicated to his patron, the earl of Macclesfield, his edition of *Longinus on the Sublime*, with a new Latin version and notes.

When the church of St Martin's was rebuilt, Dr Pearce preached a sermon at the consecration, which he afterwards printed, and accompanied with an essay on the origin and progress of temples, traced from the rude stones which were first used for altars to the noble structure of Solomon, which he considers as the first temple completely covered. His observations on that building which is called the *Temple of Dagon*, removes part of the difficulty which presents itself in the narration of the manner in which Samson destroyed it.

The deanery of Winchester being vacant, Dr

Pearce.

Pearce was appointed dean in 1739; and in the year 1741 he was elected prolocutor of the lower house of convocation for the province of Canterbury. His friends now began to think of him for the episcopal dignity; but Mr Dean's language rather declined it. However, after several difficulties had been started and removed, he consented to accept of the bishopric of Bangor, and promised Lord Hardwicke to do it with a good grace. He accordingly made proper acknowledgments of the royal goodness, and was consecrated Feb. 12. 1748. Upon the declining state of health of Dr Wilcocks, Bishop of Rochester, the bishop of Bangor was several times applied to by archbishop Herring to accept of Rochester, and the deanery of Westminster, in exchange for Bangor; but the bishop then first signified his desire to obtain leave to resign, and retire to a private life. His lordship, however, upon being pressed, suffered himself to be prevailed upon. — "My Lord (said he to the Duke of Newcastle), your grace offers these dignities to me in so generous and friendly a manner, that I promise you to accept them." Upon the death of Bishop Wilcocks, he was accordingly promoted to the see of Rochester and deanery of Westminster in 1756. Bishop Sturtevant died in 1761, and Lord Bath offered his services for getting the bishop of Rochester appointed to succeed him in the diocese of London; but the bishop told his lordship, that he had determined never to be Bishop of London or archbishop of Canterbury.

In the year 1763, his lordship being 73 years old, and finding himself less fit for the busyness of his stations as bishop and dean, informed his friend Lord Bath of his intention to resign both, and live in a retired manner upon his private fortune. Lord Bath undertook to acquaint his majesty; who named a day and hour, when the bishop was admitted alone into the closet. He told the king, that he wished to have some interval between the fatigues of business and eternity; and desired his majesty to consult proper persons about the propriety and expediency of his resignation. In about two months the king informed him, that Lord Mansfield saw no objection; and that Lord Northington, who had been doubtful, on farther consideration thought that the request might be complied with. Unfortunately for the bishop, Lord Bath applied for Bishop Newton to succeed. This alarmed the ministry, who thought that no dignities should be obtained but through their hands. They therefore opposed the resignation; and his majesty was informed that the bishops disliked the design. His majesty sent to him again; and at a third audience told him, that he must think no more of resigning. The bishop replied, "Sir, I am all duty and submission;" and then retired.

In 1768 he obtained leave to resign the deanery; in 1773, he lost his lady; and after some months of lingering decay, he died at Little Ealing, June 29. 1774.

This eminent prelate distinguished himself in every part of his life by the virtues proper to his station. His literary abilities, and application to sacred and philological learning, appear by his works; the principal of which are, A letter to the clergy of the church of England, on occasion of the bishop of Rochester's consecration to the Tower, 2d edit. 1722. Miracles of Jesus vindicated, 1727 and 1728. A review of the text of Milton, 1733. Two letters against Dr Middle-

ton, occasioned by the doctor's letter to Waterland, on the publication of his treatise, intitled, *Scripture Vindicated*, 3 edit. 1752. And since his death, a commentary with notes on the four Evangelists and the Acts of the Apostles, together with a new translation of St Paul's first Epistle to the Corinthians, with a paraphrase and notes, have been published, with his life prefixed, from original MSS. in 2 vols 4to.

The following character of this excellent bishop was published in the Gentleman's Magazine for 1755, and was written, as we are told, by a contemporary and friend. "The world has not lost for many years a more respectable member or society than the late Dr Pearce; nor the clergy a more pious and learned prelate. In his younger days, before he became a graduate, he published that excellent edition of Longinus, still admired and quoted by the best critics. What is said of Longinus himself by our excellent English poet, is as applicable to the editor: 'He is himself the great sublime he draws;' for very few of his order ever arrived to that perfection in eloquence, for which he was so justly celebrated. His diction was simple, nervous, and flowing; his sentiments were just and sublime; more sublime than the heathen critics, in proportion to the superior sublimity of the Christian revelation. Yet he was never puffed up with the general applauses of the world, but of an humble deportment, resembling the meek Jesus as far as the weakness of human nature can resemble a character without sin. His countenance was always placid, and displayed the benevolence of his heart; if his extensive charity had not proved it to a demonstration. His thirst of knowledge prompted him to a very studious life, and that rendered both his complexion and constitution delicate; yet it held out by the blessing of Providence beyond the 85th year of his age; which is the more extraordinary, considering the midnight lamp had cast a paleness over his complexion: yet with all his learning and knowledge, his humility and modesty restrained him from many publications, which the world may hope for from his executors; one particularly in divinity, which has been the object of his contemplation for many years past. With a view to complete that work, and to retire from the bustle of the world, he struggled so hard to resign his bishopric, &c. After possessing the esteem and veneration of all who knew him for a long series of years, either as rector of a very large parish, or as a dignitary of the church, he has left the world in tears; and gone to receive the infinite reward of his piety and virtue."

PEARCEII, in ichthyology. See PERCA.

The perch affords good sport for the angler. The best time for their biting is when the spring is over, and before the heats of summer come on. At this time they are very greedy; and the angler, with good management, may take at one standing all that are in the hole, be they ever so many.

The proper baits are a minnow or young frog; but the worm called the *brandling*, well scoured, is also excellent at all times of the year. When the perch bites, he should always have a great deal of time allowed him to swallow the bait.

The perch will bite all day long, if the weather be cloudy; but the best time is from eight to ten in the morning, and from three till six in the afternoon.

The

Pearce
Pearce

rch, The perch is very abstemious in winter, and will seldom bite in this season of the year; if he does at all, it is in the middle of the day: at which time indeed all fish bite best at that season.

If the bait be a minnow, which is the bait that affords most diversion to the angler, it must be fastened to the hook alive, by putting the hook through the upper lip or back-fin; it must be kept at about mid-water, and the float must be a quill and a cork, that the minnow alone may not be able to sink it.

The line must be of silk, and strong, and the hook armed with a small and fine wire, that if a pike should take the bait, as is not unfrequently the case, he may be taken. The way to carry the minnows or small gudgeons alive for baits is this: A tin pot is to be provided, with holes in the lid, and filled with water; and the fish being put in this, the water is to be changed once in a quarter of an hour by the holes, without taking off the lid at any time, except when the bait is to be taken out.

A small casting net, made for these little fish, should be taken out with the perch tackle; and one or two casts of this will take baits enough for the day, without any farther trouble. When the bait is a frog, the hook is to be fastened to the upper part of the leg. The best place for the fishing for perch is in the turn of the water near some gravelly scour. A place of this kind being pitched upon, it should be baited over-night with lobworms chopped to pieces; and in the morning, on going to it, the depth is to be regularly plumbed, and then the hook is to be baited with the worm or other bait; and as it drags along, the perch will soon seize upon it.

PEARCH-Glue, the name of a kind of glue, of remarkable strength and purity, made from the skins of perches.

PEARL, in natural history, a hard, white, shining body, usually roundish, found in a testaceous fish resembling an oyster.

Pearls, though esteemed of the number of gems by our jewellers, and highly valued, not only at this time but in all ages, proceed only from a distemper in the creature that produces them, analogous to the bezoars and other stony concretions in several animals of other kinds.

The fish in which these are usually produced is the East Indian pearl-oyster, as it is commonly called. Besides this shell, there are many others that are found to produce pearls; as the common oyster, the mussel, and several others; the pearls of which are often very good; but those of the true Indian becheri, or pearl-oyster, are in general superior to all. The small or seed pearl, also called *ounce pearls*, from their being sold by the ounce and not by tale, are vastly the most numerous and common: but, as in diamonds, among the multitudes of small ones, there are smaller numbers and larger found, so in pearls there are larger and larger kinds; but as they increase in size, they are proportionably less frequent; and this is one reason of their great price. We have Scotch pearls frequently as big as a little tare, some as big as a large pea, and some few of the size of a horse-bean; but these are usually of a bad shape, and of little value in proportion to their weight. Philip II. of Spain had a pearl perfect in its shape and colour, and of the size

of a pigeon's egg. The finest, and what is called the true shape of the pearl, is a perfect round; but if pearls of a considerable size are of the shape of a pear, as is not unfrequently the case, they are not less valued, as they serve for earrings and other ornaments. Their colour ought to be a pure white; and that not a dead and lifeless, but a clear and brilliant one: they must be perfectly free from any foulness, spot, or stain; and their surfaces must be naturally smooth and glossy; for they bring their natural polish with them, which art is not able to improve.

All pearls are formed of the matter of the shell, and consist of a number of coats spread with perfect regularity one over another, in the manner of the several coats of an onion, or like the several strata of the stones found in the bladders or stomachs of animals, only much thinner.

Manner of Fishing for PEARLS in the East Indies.—There are two seasons for pearl fishing: the first is in March and April, and the last in August and September; and the more rain there falls in the year, the more plentiful are these fisheries. At the beginning of the season there are sometimes 250 barks on the banks; the larger barks have two divers, and the smaller one. As soon as the barks arrive at the place where the fish lie, and have cast anchor, each diver binds a stone, six inches thick and a foot long, under his body; which serves him as a ballast, prevents his being driven away by the motion of the water, and enables him to walk more steadily under the waves. They also tie another very heavy stone to one foot, by which they are very speedily sent to the bottom of the sea: and as the oysters are usually firmly fastened to the rocks, they arm their hands with leather mittens, to prevent their being wounded in pulling them violently off; but this task some perform with an iron rake. In the last place, each diver carries down with him a large net in the manner of a sack, tied to his neck by a long cord, the other end of which is fastened to the side of the bark. This net is to hold the oysters gathered from the rock, and the cord is to pull up the diver when his bag is full, or when he wants air.

In this equipage he sometimes precipitates himself sixty feet under water; and as he has no time to lose, he no sooner arrives at the bottom, than he begins to run from side to side, tearing up all the oysters he meets with, and cramming them into his bag.

At whatever depth the divers are, the light is so great, that they easily see whatever passes in the sea; and to their great contentment, sometimes perceive monstrous fishes, from which all their address in muddying the water, &c. will not always save them, but they unhappily become their prey: and of all the dangers of the fishery, this is one of the greatest and most usual. The best divers will keep under water near half an hour, and the rest do not stay less than a quarter. During this time they hold their breath without the use of oils or any other liquors; only acquiring the habit by long practice. When they find themselves straitened, they pull the rope to which the bag is fastened, and hold fast by it with both hands: when those in the bark, taking the signal, heave them up into the air, and unload them of

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their fish; which is sometimes 500 oysters, and sometimes not above 50. Some of the divers need a moment's respite to recover breath; others jump in again instantly, continuing this violent exercise without intermission for several hours.

On the shore they unload their barks, and lay their oysters in an infinite number of little pits dug in the sand four or five feet square, raising heaps of sand over them to the height of a man; and in this condition they are left till the rain, wind, and sun, have obliged them to open, which soon kills them: upon this the flesh rots and dries, and the pearls, thus disengaged, fall into the pit on their taking out the shells. After clearing the pits of the grosser filth, they sift the sand several times in order to find the pearl; but, whatever care they take, they always lose a great many. After cleaning and drying the pearls, they are passed through a kind of sieve, according to their sizes; the smallest are then sold as seed-pearls, and the rest put up to auction, and sold to the highest bidder.

Though those ornaments are met with in all quarters of the globe, the most esteemed have always been those of Asia and the east coast of Africa. In the kingdom of Madura, which lies on the east of Malabar, there are many pearl fisheries. Tutukuria or Tutucorin is the principal, if not the only, city on the fishery coast. At the time the Portuguese were masters in these parts, the taking of oysters in the straits betwixt the island of Ceylon and the continent, was styled, by way of excellence, the *fishery*, and very deservingly; for though some prefer the pearls taken near the island of Baharen in the Persian gulf, and those likewise found on the coast of China at Hainan, yet it might be very easily proved, from the comparison of the annual amount of those fisheries within this period, that they were very seldom superior to this of which we are speaking. It was one of the wisest points in the Portuguese policy, that, though they were really in possession of this beneficial commerce, yet they chose to dissimble it, and took all imaginable precautions in order to make the natives believe that they were perfectly free, and that their interposition was not so much the effects of authority as of good-will; it was for this reason that they never pretended to erect any fort either at Tutucorin or at Calipatnam, two towns upon the continent, from whence most of the fishers and their barks came, and that they suffered the ancient customs to take place.

The season of the fishery was the latter end of April or beginning of May, sometimes sooner, sometimes later, according to the weather. The direction of it was left entirely to the sovereign of the country, called the *naik*; and the Portuguese, in quality of the protectors of the sea, sent two frigates to defend the fishing-vessels from the Malabar and Maldive pirates. The time which this pearl-fishing lasted was about a fortnight, of the beginning of which the *naik* gave public notice; and, the day being come, there repaired to the place assigned several thousands of people of all sexes and ages, and an indefinite number of fishing vessels, and divers from five or six hundred to a thousand or more. Upon a signal given the boats put to sea; and, having chose their proper station, the divers plunged and brought up the oy-

sters in little baskets upon their heads; with which the boats being sufficiently laden, they were carried on shore, where the people who remained there for that purpose buried them in the sand, till, by the heat of the sun, the fish was corrupted and consumed, and the pearls easily taken out. The whole conduct of the first day's fishery belonged to the *naik*; and, after that deduction, what was caught every day was separated, and particularly distinguished, but went to the common profit. The whole number of the people employed at sea and on shore amounted frequently to 50,000 or 60,000 souls; and the pavilions and tents set up for their accommodation made a fine appearance at a distance. When the pearls were extracted, cleansed, and dried, they passed them through a kind of sieves, by which their sizes were distinguished. When all was over, the *naik* appointed a time and place for the public market; in consequence of which there was a kind of fair, that lasted commonly from the close of June till the beginning of September. The smallest, which are what we call *seed pearl*, they sold by weight, and all the rest according to their respective sizes and beauty, from a few shillings up to ten or twenty pounds, and sometimes more a-piece; but there were few buyers, except the Portuguese merchants, who, bringing ready money, had got bargains, and thus all parties were pleased. The Portuguese assumed the protection of this fishery very soon after they settled in the Indies, and held it till the year 1658, when, in consequence of their losses in Ceylon and elsewhere, it fell into the hands of the Dutch, who have remained in possession of it ever since.

The Dutch have changed this method, as we are informed by a person very well acquainted with their affairs. The course into which they have put it is, in few words, this: the camp is sometimes held on the coast of Madura, upon the continent; sometimes on the island of Manar, which is in the hands of the Dutch, who, notwithstanding, follow the example of the Portuguese, and lay claim to no higher title than that of protectors of the fishery, in which quality their commissary is ever in the camp, as well as the *naik* or sovereign of the country, who is also the *rajah* of Tanjour. The oysters caught every day are put up in tuns or barrels, of which, when a certain number are full, they put them up to sale by way of auction; and the merchants bid according as they have an opinion of the oysters for the season: but the middle price is between 30 and 40 shillings sterling per cask. When a merchant has bought such a lot as this, he carries it to his quarters; and after a certain number of days he proceeds to opening the oysters, but always in the air, for the stench is so great as to be almost insupportable. They open them over tubs, into which they pour what comes out of the oyster, as also that muddy water that remains in the cask; next they draw it out into cullenders of several sizes, and at length perhaps they find four or five shillings worth of pearls, sometimes to the value of ten or twelve pounds; so that it is a perfect lottery, by which some few becoming rich, it betrays numbers into beggary. This pearl-fishery, we are told, brings the Dutch company an annual tribute of 20,000*l*.

There are a variety of rivers great and small in Eastern Tartary considerable for pearl-fishery; but these

*Mel. Univ.
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these pearls, though much esteemed by the Tartars, would be little valued by Europeans, on account of their defects in shape and colour. The Emperor Kang-hi had several chaplets or strings of these pearls, each containing 100, which were very large, and exactly matched. There are many rivulets in Livonia which produce pearls almost equal in size and clearness to the Oriental ones. There are several fisheries both on the eastern and western coasts of Africa; the most considerable of which lie round some small islands, over-against the kingdom of Sofala; but the people thus employed, instead of exposing the oysters to the warmth of the sun, which would induce them to open, lay them upon the embers; by which absurd method, those pearls which they catch contract a dull kind of redness, which robs them of their natural lustre as well as of their value. Pearl-fishing is performed by the women as well as the men; both being equally expert. In the sea of California also there are very rich pearl-fisheries. In Japan likewise there are found pearls of great price. Pearls are met with in all parts of the Red Sea in the Indian Ocean, on the low part of the coast of Arabia Felix named *Baharen*, adjoining to the Persian Gulf. They are likewise found on the low coast about Gunibroom to the eastward of the Persian Gulf; and many of the finest kind are met with on the coasts of Ceylon. They are most plentiful in the Baharen, between the coast of Arabia Felix and Ormus, whence they are transported to Aleppo, then sent to Leghorn, and then circulated through Europe.

It has been very commonly supposed, that pearls are found in a kind of oysters; and such the pearl fishes are called in part of the above account extracted from the Universal History; but Mr Bruce absolutely denies this, and informs us that there is no such fish as an oyster to be met with in the Red Sea in particular. They are indeed found in bivalve shells, of which there are three kinds commonly sought after by the pearl fishers. One of these is a kind of muscle now very rare; but whether more plentiful formerly than at present is not known; they are principally found in the north end of the Red Sea and on the Egyptian side; and Mr Bruce informs us, that the only place in which he ever met with them was about Cossair, and to the northward of it, where there was an ancient port called *Myos Hermos*, "which (says Mr Bruce) commentators have called the port of the *Moufe*, when they should have translated it the harbour of the *Muscle*."

The second sort of shell is called *Pinna*. It is broad and semicircular at the top, decreasing gradually until it turns sharp at the lower end, where the hinge is. The outside is rough and figured, of a beautiful red colour, and sometimes three feet long, and extremely brittle; the inside lined with that beautiful substance called *nacre*, or mother-of-pearl.

The third kind of Pearl-shell is the only one which can be said to bear any resemblance to the oyster; though even this is evidently of a different genus.

In a general view of the writings of Linnæus by Richard Pulteney, M. D. p. 42. it is said that Linnæus made a remarkable discovery relating to the generation of pearls: in the river pearl-muscle (*mya margaritifera*) a shell fish found in several rivers of Great

Britain and Ireland; that this fish will bear removal remarkably well; and that in some places they form reservoirs for the purpose of keeping it, and taking out the pearl, which in a certain period will be renewed again. The discovery was a method which Linnæus found of putting these muscles into a state of producing pearls at his pleasure, though the final effect did not take place for several years; but that in five or six years after the operation, the pearl would have acquired the size of a vetch. Dr Pulteney regrets that we are unacquainted with the means by which Linnæus accomplished this extraordinary operation, which was considered as important, since it is certain the author was rewarded with a munificent premium from the states of the kingdom on that account.

The colours of pearls are different according to the shells in which they are found. The first kind often produces those of a fine shape and excellent lustre, but seldom of that very fine colour which enhances their price. The second kind produces pearls having the reddish cast of the inner shell of the *pinna*, called *mother of pearl*; which seems to confirm the opinion of Reaumur, that the pearls are formed from the glutinous fluid which makes the first rudiments of the shell; and this kind of pearl is found to be more red as it is formed nearer the broad part of the shell, which is redder than the other end. Mr Bruce is of opinion, that the pearl found in this shell is the *penim* or *peninim* of Scripture; and that this name is derived from its redness. "On the contrary (says he), the word *pinna* has been idly imagined to be derived from *penna*, a feather; as being broad and round at the top, and ending at a point, or like a quill below. The English translation of the Scripture, erroneous and inaccurate in many things more material, translates this *peninim* by rubies, without any foundation or authority but because they were both red, as are bricks or tiles, and many other things of base materials. The Greeks have translated it literally *pina* or *pinna*, and the shell they call *pinnicus*; and many places occur in Strabo, Theophrastus, Elian, and Ptolemy, which are mentioned as famous for this kind of pearl. I should imagine also, that by Solomon saying it is the most precious of all productions, he means that this species of pearl was the most valued or the best known in Judæa; for though we learn from Pliny that the excellency of pearls was their whiteness, yet we know that the pearls of a yellowish cast are those esteemed in India to this day, as the *peninim* or reddish pearl was in Judæa in the days of Solomon. In Job, where all the variety of precious stones are mentioned, the translator is forced, as it were unwillingly, to render *peninim* pearls, as he ought indeed to have done in many other places where it occurs."

The third sort of shell produces pearls of extreme whiteness, which Bechart says are called *darra* or *dara* in Arabic; which seems to be a general term for all kinds of pearls in Scripture, whereas the *peninim* is one in particular. But though the character of this pearl be extreme whiteness, we are told by Pliny that there are shades or differences of it. The clearest, he says, are those of the Red Sea; but the pearls of India have the colour of the flakes or divisions of the lapis specularis. The most excellent are those like a solution

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of alum, limpid, milky-like, and even with a certain almost imperceptible cast of a fiery colour. Theophrastus tells us, that these pearls are transparent, as the description of Pliny would lead us to imagine; but it is not so: and if they were, it is apprehended they would lose all their beauty and value, and approach too much to glass. The value of these commodities depends upon their size, regularity of form, whether round or not, weight, smoothness, colour, and the different shades of that colour. The pearl fishers say, that when the shell is smooth and perfect, they never expect to find any pearls, but always do so when it has begun to be deformed and distorted. Hence it would seem, that as the fish turned older, the vessels containing the juice for forming the shell, and keeping it in its vigour, grew weak and ruptured; and thence, from this juice accumulating in the fish, the pearl was formed, and the shell brought to decay, as supposed by Mr Reaumur. If this be the case, it ought to be known by the form of the shell whether the pearl is large or small; and thus the smaller ones being thrown back into the sea, a constant crop of large pearls might be obtained.

Pliny says that pearls are the most valuable and excellent of all precious stones; and from our Saviour's comparing the kingdom of heaven to a pearl, it would seem that they really were held in such high estimation at that time. Mr Bruce, however, is of opinion, that this extraordinary value was put only upon the very large kind; of which we are told, that Servilia, the mother of Marcus Brutus, presented one to Cæsar of the value of 50,000*l.* of our money; and Cleopatra dissolved one worth 250,000*l.* in vinegar, which she drank at a supper with Mark Antony.

It is generally said that the pearl shells grow on rocks, which, together with the method of catching them, we have already mentioned. Some say they are taken with nets: from whence Mr Bruce contraverts the idea of their growing on rocks; for nobody, he says, would employ nets to gather fish from among rocks. He tells us, that all kinds of them are found in the deep fit and stillest water, and softest bottom; the parts of most of them being too fine to bear the agitation of the sea among the rocks. It is observed that they produce the most beautiful pearls in those places of the sea where a quantity of fresh water falls. "Thus (says Mr Bruce), in the Red Sea, they are always most esteemed that were fished from Suakern southward, that is, in those parts corresponding to the country anciently called *Berberia* and *Azania*; on the Arabian Coast, near the island Camaran, where there is abundance of fresh water; and in the island of Foosht. As it is a fish that delights in repose, I imagine it avoids this part of the Gulf, as lying open to the Indian Ocean, and agitated by variable winds."

Mr Bruce mentions a muscle found in the salt springs of the Nubian desert; in many of which he found those excrescences which might be called pearls,

but all of them ill formed, foul, and of a bad colour, though of the same consistence, and lodged in the same part of the body as those in the sea. "The muscle, too (says our author), is in every respect similar, I think larger. The outer skin or covering of it is of a vivid green. Upon removing this, which is the epidermis, what next appears is a beautiful pink, without gloss, and seemingly of a calcareous nature. Below this, the mother-of-pearl, which is underneath, is a white without lustre, partaking much of the blue and very little of the red; and this is all the difference I observed between it and the pearl-bearing muscle of the Red Sea."

"In Scotland, especially to the northward (A), in all rivers running from lakes, there are found muscles that have pearls of more than ordinary merit, though seldom of large size. They were formerly tolerably cheap, but lately the wearing of real pearls coming into fashion, those of Scotland have increased in price greatly beyond their value, and superior often to the price of oriental ones when bought in the east. The reason of this is a demand from London, where they are actually employed in work, and sold as oriental. But the excellency of all glass or paste imitations, it is likely, will keep the price of this article, and the demand for it, within bounds, when every lady has it in her power to wear in her ears, for the price of sixpence, a pearl as beautiful in colour, more elegant in form, lighter and easier to carry, and as much bigger as she pleases, than the famous ones of Cleopatra and Servilia. In Scotland, as well as in the east, the smooth and perfect shell rarely produces a pearl; the crooked and distorted shell seldom wants one.

The mother-of-pearl manufactory is brought to the greatest perfection at Jerusalem. The most beautiful shell of this kind is that of the *ponim* already mentioned; but it is too brittle to be employed in any large pieces of workmanship; whence that kind named *dora* is most usually employed; and great quantities of this are daily brought from the Red Sea to Jerusalem. Of these, all the fine works, the crucifixes, the wafer-boxes, and the beads, are made, which are sent to the Spanish dominions in the New World, and produce a return incomparably greater than the staple of the greatest manufactory in the Old.

Very little is known of the natural history of the pearl fish. Mr Bruce says, that, as far as he has observed, they are all stuck upright in the mud by an extremity; the muscle by one end, the pinna by the small sharp point, and the third by the hinge or square part which projects from the round. "In shallow and clear streams (says Mr Bruce), I have seen small burrows or tracks upon the sandy bottom, by which you could trace the muscle from its last station; and these not straight, but deviating into traverses and triangles, like the course of a ship in a contrary wind laid down upon a map, probably in pursuit of food. The general belief is, that the muscle is constantly stationary in a state of repose, and cannot transfer itself from place to

(A) There has been in these parts (*i. e.* at Perth) a very great fishery of pearl got out of the fresh-water muscles. From the year 1761 to 1764, 15,000*l.* worth were sent to London, and sold from 10*s.* to 1*l.* 16*s.* per ounce. We were told that a pearl had been taken there that weighed 33 grains. But this fishery is at present exhausted, from the avarice of the undertakers: it once extended as far as Loch-Tay.

to place. This is a vulgar prejudice, and one of those facts that are mistaken for want of sufficient pains or opportunity to make more critical observations. Others, finding the first opinion a false one, and that they are endowed with power of changing place like other animals, have, upon the same foundation, gone into the contrary extreme, so far as to attribute swiftness to them, a property surely inconsistent with their being fixed to rocks. Pliny and Solinus say that the muscles have leaders, and go in flocks; and that their leader is endowed with great cunning to protect himself and his flock from the fishers; and that, when he is taken, the others fall an easy prey. This, however, we may justly look upon to be a fable; some of the most accurate observers having discovered the motion of the muscle, which indeed is wonderful, and that they lie in beds, which is not at all so, have added the rest, to make their history complete." Our author informs us, that the muscles found in the salt springs of Nubia likewise travel far from home, and are sometimes surprised, by the ceasing of the rains, at a greater distance from their beds than they have strength and moisture to carry them. He assures us, that none of the pearl-fish are eatable; and that they are the only fish he saw in the Red Sea that cannot be eaten.

Artificial PEARLS. Attempts have been made to take out stains from pearls, and to render the foul opaque-coloured ones equal in lustre to the oriental. Abundance of processes are given for this purpose in books of secrets and travels; but they are very far from answering what is expected from them. Pearls may be cleaned indeed from any external foulnesses by washing and rubbing them with a little Venice soap and warm water, or with ground rice and salt, with starch and powder-blue, plaster of Paris, coral, white vitriol and tartar, scutell-bone, pumice-stone, and other similar substances; but a stain that reaches deep into the substance of pearls is impossible to be taken out. Nor can a number of small pearls be united into a mass similar to an entire natural one, as some pretend.

There are, however, methods of making artificial pearls, in such manner as to be with difficulty distinguished from the best oriental. The ingredient used for this purpose was long kept a secret; but it is now discovered to be a fine silver-like substance found upon the under side of the scales of the blay or bleak fish. The scales, taken off in the usual manner, are washed and rubbed with fresh parcels of fair water, and the several liquors suffered to settle: the water being then poured off, the pearly matter remains at the bottom, of the consistence of oil, called by the French *essence d'orient*. A little of this is dropped into a hollow bead of bluish glass, and shaken about so as to line the internal surface; after which the cavity is filled up with wax, to give solidity and weight. Pearls made in this manner are distinguishable from the natural only by their having fewer blemishes.

Mother of PEARL, the shell, not of the pearl oyster, but of the *mytilus margaritifera*. See MYTILUS.

PEARL-Ash, a kind of fixed alkaline salt, prepared chiefly in Germany, Russia, and Poland, by melting the salts out of the ashes of burnt wood; and having reduced them again to dryness, evaporating the moisture, and calcining them for a considerable time in a furnace moderately hot. The goodness of pearl-ashes

must be distinguished by the uniform and white appearance of them: they are nevertheless subject to a common adulteration, not easy to be distinguished by the mere appearance, which is done by the addition of common salt. In order to find out this fraud, take a small quantity of the suspected salt; and after it has been softened by lying in the air, put it over the fire in a shovel: if it contains any common salt, a crackling and kind of slight explosion will take place as the salt grows hot.

Pearl-ashes are much used in the manufacture of glass, and require no preparation, except where very great transparency is required, as in the case of looking-glass, and the best kind of window-glass. For this purpose dissolve them in four times their weight of boiling water: when they are dissolved, let the solution be put into a clean tub, and suffered to remain there 24 hours or more. Let the clear part of the fluid be then decanted off from the sediment, and put back into the iron pot in which the solution was made; in this let the water be evaporated till the salts be left perfectly dry. Keep those that are not designed for immediate use in stone jars, well secured from moisture and air.

Mr Kirwan, who has tried a course of experiments on the alkaline substances used in bleaching, &c. (see *Irisb Transf.* for 1789), tells us, that in 100 parts of the Dantzick pearl-ash, the vegetable alkali amounted to somewhat above 63. His pearl-ash he prepares by calcining a ley of vegetable ashes dried into a salt to whiteness. In this operation, he says, "particular care should be taken that it should not melt, as the extractive matter would not be thoroughly consumed, and the alkali would form such a union with the earthy parts as could not easily be dissolved." He has "added this caution, as Dr Lewis and Mr Dossie have inadvertently directed the contrary." We apprehend, however, that here is a little inaccuracy; and that it was not for pearl-ash, but for the unrefined pot-ash, that these gentlemen directed fusion. The fact is, that the American pot-ashes, examined by them, had unquestionably suffered fusion: which was effected in the same iron pot in which the evaporation was finished, by rather increasing the fire at the end of the process: by this management, one of the most troublesome operations in the whole manufacture, the separation of the hard salt from the vessels with hammers and chisels, was avoided; and though the extractive matter was not consumed, it was burnt to an indissoluble coal; so that the salt, though black itself, produced a pale or colourless solution, and was uncommonly strong. Mr Kirwan has also given tables of the quantities of ashes and salt obtained from different vegetables; and he concludes from them, 1. "That in general weeds yield much more ashes, and their ashes much more salt, than woods; and that, consequently, as to salts of the vegetable alkali kind, neither America, Trieste, nor the northern countries, possess any advantage over us. 2. That of all weeds, fumitory produces most salt, and next to it wormwood; but if we attend only to the quantity of salt in a given weight of ashes, the ashes of wormwood contain most. *Trifolium fibrinum* also produces more ashes and salt than fern." See POTASH.

PEARSON (John), a very learned English bishop

Peasant,
Peasant.

in the 17th century, was born at Snoring in 1613. After his education at Eton and Cambridge, he entered into holy orders in 1639, and was the same year collated to the prebend of Netherhaven in the church of Sarum. In 1640 he was appointed chaplain to the lord keeper Finch, and by him presented to the living of Torrington in Suffolk. In 1650 he was made minister of St Clement's, East cheap, in London. In 1657, he and Mr Gunning had a dispute with two Roman Catholics upon the subject of schism; a very unfair account of which was printed at Paris in 1658. Some time after, he published at London An Exposition of the Creed, in folio, dedicated to his parishioners of St Clement's, East cheap, to whom the substance of that excellent work had been preached several years before, and by whom he had been desired to make it public. The same year he likewise published The Golden Remains of the ever memorable Mr John Hales of Eton; to which he prefixed a preface, containing, of that great man, with whom he had been acquainted for many years, a character drawn with great elegance and force. Soon after the Restoration, he was presented by Juxon, then Bishop of London, to the rectory of St Christopher's in that city; created doctor of divinity at Cambridge, in pursuance of the king's letters mandatory; installed prebendary of Ely; archdeacon of Sarum; and made master of Jesus college in Cambridge: all before the end of the year 1660. March 25th 1661, he was appointed Margaret professor of divinity in that university; and, the first day of the ensuing year, was nominated one of the commissioners for the review of the liturgy in the conference at the Savoy. April 14th 1662, he was admitted master of Trinity college in Cambridge; and, in August, resigned his rectory of St Christopher's and prebend of Sarum.— In 1667 he was admitted a Fellow of the Royal Society. In 1672 he published at Cambridge, in 4to, *Judicis Epistolarum S. Ignatii*, in answer to Mons. Duille; to which is subjoined, *Isaaci Vossii epistolæ duæ adversus Davidem Blondellum*. Upon the death of the celebrated Wilkins, Pearson was appointed his successor in the see of Chester, to which he was consecrated February 9th 1672-3. In 1682, his *Annals Cyprianæ, sive tredecim annorum, quibus S. Ulprian. inter Christianos versatus est, historia chronologica*, was published at Oxford, with Fell's edition of that Father's works. Pearson was disabled from all public service by ill health a considerable time before his death, which happened at Chester, July 16th 1686.

PEASANT, a hind, one whose business is in rural labour.

It is amongst this order of men that a philosopher would look for innocent and ingenuous manners. The situation of the peasantry is such as excludes them from the devastations of luxury and licentiousness; for when the contagion has once reached the recesses of rural retirement, and corrupted the minds of habitual innocence, that nation has reached the summit of vice, and is hastening to that decay which has always been the effect of vicious indulgence. The peasantry of this country still in a great measure retain that simplicity of manners and rustic innocence which ought to be the characteristic of this order of society; and, in many parts, their condition is such as, were all its advantages sufficiently known, would create envy in the minds of

those who have toiled through life, amidst the bustle of the world, in quest of that happiness which it could not confer.

*O fortunatus nimium, sua se bona norint,
Agricolæ.*—

Virgil.

In other countries the peasants do not enjoy the same liberty as they do in our own, and are consequently not so happy. In all feudal governments they are abject slaves, entirely at the disposal of some petty despot. This was the case in Poland, where the native peasants were subject to the most horrid slavery, though those descended of the Germans, who settled in Poland during the reign of Boleslaus the Chaste and Cassimir the Great, enjoyed very distinguished privileges. Amongst the native slaves, too, those of the crown were in a better condition than those of individuals. See POLAND.

The peasants of Russia (Mr Coxé tells us) are a hardy race of men, and of great bodily strength. Their cottages are constructed with tolerable propriety, after the manner of those in Lithuania; but they are very poorly furnished. The peasants are greedy of money, and, as the same author informs us, somewhat inclined to thieving. They afford horses to travellers, and act the part of coachmen and postillions. “In their common intercourse they are remarkably polite to each other: they take off their cap at meeting; bow ceremoniously and frequently, and usually exchange a salute. They accompany their ordinary discourse with much action, and innumerable gestures; and are exceedingly servile in their expressions of deference to their superiors: in accosting a person of consequence, they prostrate themselves, and even touch the ground with their heads. We were often struck at receiving this kind of eastern homage, not only from beggars, but frequently from children, and occasionally from some of the peasants themselves.

“The peasants are well clothed, comfortably lodged, and seem to enjoy plenty of wholesome food. Their rye-bread, whose blackness at first disgusts the eye, and whose sourness the taste, of a delicate traveller, agrees very well with the appetite; as I became reconciled to it from use, I found it at all times no unpleasant morsel, and, when seasoned with hunger, it was quite delicious: they render this bread more palatable, by stuffing it with onions and groats, carrots or green corn, and seasoning it with sweet oil. The rye-bread is sometimes white, and their other articles of food are eggs, salt-fish, bacon, and mushrooms; their favourite dish is a kind of hodge podge, made of salt, or sometimes fresh meat, groats, rye-flour, highly seasoned with onions and garlick, which latter ingredients are much used by the Russians. Besides, mushrooms are so exceedingly common in these regions, as to form a very essential part of their provision. I seldom entered a cottage without seeing great abundance of them; and in passing through the markets, I was often astonished at the prodigious quantity exposed for sale: their variety was no less remarkable than their number; they were of many colours, amongst which I particularly noticed white, black, brown, yellow, green, and pink. The common drink of the peasants is quass, a fermented liquor, somewhat like sweet-wort, made by pouring warm water on rye

or barley-meal; and deemed an excellent antiscorbutic. They are extremely fond of whiskey, a spirituous liquor distilled from malt, which the poorest can occasionally command, and which their inclination often leads them to use to great excess."

These people are extremely backward in the mechanic arts, though, where they have much intercourse with other nations, this does not appear, and therefore does not proceed from natural inability; indeed we have already given an instance of one peasant of Russia, who seems to possess very superior talents. See NEVA.

The dress of these people is well calculated for the climate in which they live: they are particularly careful of their extremities. On their legs they wear one or two pair of thick worsted stockings; and they envelope their legs with wrappers of coarse flannel or cloth several feet in length, and over these they frequently draw a pair of boots, so large as to receive their bulky contents with ease. The lower sort of people are grossly ignorant; of which we shall give a very surprising instance in the words of Mr Coxe:—"In many families, the father marries his son while a boy of seven, eight, or nine years old, to a girl of a more advanced age, in order, as it is said, to procure an able-bodied woman for the domestic service: he cohabits with this person, now become his daughter-in-law, and frequently has several children by her. In my progress through Russia, I observed in some cottages, as it were, two mistresses of a family; one the peasant's real wife, who was old enough to be his mother; and the other, who was nominally the son's wife, but in reality the father's concubine. These incestuous marriages, sanctified by inveterate custom, and permitted by the parish-priests, were formerly more common than they are at present; but as the nation becomes more refined, and the priests somewhat more enlightened; and as they have lately been discountenanced by government, they are daily falling into disuse; and, it is to be hoped, will be no longer tolerated (A)."

The peasants of Russia, like those of Poland, are divided into those of the crown and those of individuals; the first of which are in the best condition; but all of them undergo great hardships, being subject to the despotic will of some cruel overseer. They may obtain freedom, 1. By manumission on the death of their master, or otherwise: 2. By purchase; and, lastly, By serving in the army or navy. The Empress has redressed some of the grievances of this class of her

subjects. The hardness of the peasants arises in a great measure from their mode of education and way of life, and from the violent changes and great extremes of heat and cold to which they are exposed.

"The peasants of Finland differ widely from the Russians in their look and dress: they had for the most part fair complexions, and many of them red hair: they shave their beards, wear their hair parted at the top, and hanging to a considerable length over their shoulders (B). We could not avoid remarking, that they were in general more civilized than the Russians; and that even in the smallest villages we were able to procure much better accommodations than we usually met with in the largest towns which we had hitherto visited in this empire."

The peasants of Sweden (Mr Coxe informs us) are more honest than those in Russia; in better condition, and possessing more of the conveniences of life, both with respect to food and furniture. "They are well clad in strong cloth of their own weaving. Their cottages, though built with wood, and only of one story, are comfortable and commodious. The room in which the family sleep is provided with ranges of beds in tiers (if I may so express myself), one above the other: upon the wooden testers of the beds in which the women lie, are placed others for the reception of the men, to which they ascend by means of ladders. To a person who has just quitted Germany, and been accustomed to tolerable inns, the Swedish cottages may perhaps appear miserable hovels; to me, who had been long used to places of far inferior accommodation, they seemed almost palaces. The traveller is able to procure many conveniences, and particularly a separate room from that inhabited by the family, which could seldom be obtained in the Polish and Russian villages. During my course through those two countries, a bed was a phenomenon which seldom occurred, excepting in the large towns, and even then not always completely equipped; but the poorest huts of Sweden were never deficient in this article of comfort: an evident proof that the Swedish peasants are more civilized than those of Poland and Russia.—After having witnessed the slavery of the peasants in those two countries, it was a pleasing satisfaction to find myself again among freemen, in a kingdom where there is a more equal division of property; where there is no vassalage; where the lowest order enjoy a security of their persons and property; and where the advantages resulting from this right are visible to the commonest observer."

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(A) "The truth of this fact, which fell under my own observation, and which I authenticated by repeated inquiries from all ranks of people, is still further confirmed by the following passage in the Antidote to the Journey into Siberia, although the author gives another reason for those early marriages. 'The peasants and common people not only marry their sons at 14 and 15 years of age, but even at eight or nine, and that for the sake of having a workwoman the more in the person of the son's wife: By the same rule, they try to keep their daughters single as long as possible, because they don't choose to lose a workwoman. These premature marriages are of very little use to the state; for which reason, methods to get the better of this custom have been sought for, and, I hope, will soon take place: the bishops are attentive to prevent these marriages as much as possible, and have of late succeeded greatly in their endeavours. It is only the inhabitants of some of the provinces in Russia that still retain this bad custom.'"

(B) The Russians have generally dark complexions and hair: they also wear their beards, and cut their hair short.

Peat.

The peafents of Holland and Switzerland are all in a very tolerable condition; not fubject to the undilputed controul of a hireling matter, they are freemen, and enjoy in their feveral ftations the bleffings of freedom. In Bohemia, Hungary, and a great part of Germany, they are legally flaves, and fuffer all the miferies attending fuch a condition. In Spain, Savoy, and Italy, they are little better. In France, their fituation was fuch as to warrant the firft Revolution; but by carrying matters too far, they are now infinitely worfe than they were at any former period.

PEAT, a well known inflammable fubftance, ufed in many parts of the world as fuel. There are two fpecies:

1. A yellowifh-brown or black peat, found in moorifh grounds in Scotland, Holland, and Germany.—When fresh, it is of a vitelid confiftence, but hardens by expofure to the air. It confifts, according to Kirwan, of clay mixed with calcareous earth and pyrites; fometimes alfo it contains common falt. While foft, it is formed into oblong pieces for fuel, after the pyriteous and ftoney matters are feparated. By diftillation it yields water, acid, oil, and volatile alkali; the afhes containing a fmall proportion of fixed alkali; and being either white or red according to the proportion of pyrites contained in the fubftance.

The oil which is obtained from peat has a very pungent tafte; and an empyreumatic fmell, lefs fetid than that of animal fubftances, more fo than that of mineral bitumens: it congeals in the cold into a pitchy mafs, which liquifies in a fmall heat: it readily catches fire from a candle, but burns lefs vehemently than other oils, and immediately goes out upon removing the external flame: it diffolves almoft totally in rectified fpirit of wine into a dark brownifh red liquor.

2. The fecond fpecies is found near Newbury in Berkfhire. In the Philofophical Tranfactions for the year 1757, we have an account of this fpecies; the fubftance of which is as follows:

Peat is a compofition of the branches, twigs, leaves, and roots of trees, with grafs, ftraw, plants, and weeds, which having lain long in water, is formed into a mafs fo foft as to be cut through with a fharp fpathe. The colour is a blackifh brown, and it is ufed in many places for firing. There is a ftatum of this peat on each fide the Kennet, near Newbury in Berks, which is from about a quarter to half a mile wide, and many miles long. The depth below the furface of the ground is from one foot to eight. Great numbers of entire trees are found lying irregularly in the true peat. They are chiefly oaks, alders, willows, and firs, and appear to have been torn up by the roots: many horfes heads, and bones of feveral kinds of deer; the horns of the antelope, the heads and tufts of boars, and the heads of beavers, are alfo found in it. Not many years ago an urn of a light brown colour, large enough to hold about a pailon, was found in the peat-pit in Speen moor, near Newbury, at about 10 feet from the river, and four feet below the level of the neighbouring ground. Juft over the fpot where the urn was found, an artificial hill was raifed about eight feet high; and as this hill confifted both of peat and earth, it is evident that the peat was older than the urn. From

the fide of the river feveral femicircular ridges are drawn round the hill, with trenches between them. The urn was broken to fivers by the peat-diggers who found it, fo that it could not be critically examined; nor can it be known whether any thing was contained in it.

With peat alfo may be clafled that fubftance called in England ftone turf; which hardens after its firft expofure to the air, but afterwards crumbles down.—The other common turf confifts only of mould interwoven with the roots of vegetables; but when thefe roots are of the bulbous kind, or in large proportion, they form the worft kind of turf. “Although it may appear incredible (fays M. Magellan), it is nevertheless a real fact, that, in England, pit-turf is advantageoufly employed in Lancashire to fmelt the iron-ore of that county. Mr Wilkinfon, brother-in-law to Dr Priestley, makes ufe of pit-turf in his large fmelting furnaces. I have feen in the poffeffion of Mr S. More, fecretary to the Society of Arts, a kind of black tallow, extracted by the faid Mr Wilkinfon from pit-turf. It was very foft, and nearly of the fame confiftence with butter. It burnt very rapidly, with a fmoky flame in the fire; but the fmell was very difagreeable, like that of pit-turf.” The great caufe of the differences of peat moft likely aries from the different mineral admixtures. Some forts of peat yield in burning a very difagreeable fmell, which extends to a great diftance; whilft others are inoffenfive.—Some burn into grey or white, and others into red ferrugineous afhes. The afhes yield, on exaction, a fmall quantity of alkaline falt, with fometimes one and fometimes another falt of the neutral kind.

The fmoke of peat does not preferve or harden fheff like that of wood; and the foot, into which it condenfes, is more difpofed to liquefy in moift weather.

Peat afhes, properly burnt for a manure, are noble improvers both of corn and grafs land: but the fubftance from which they fhould be got is an under ftatum of the peat, where the fibres and roots of the earth, &c. are well decayed. Indeed the very beft are procured from the loweft ftatum of all. This will yield a large quantity of very ftrong afhes, in colour (when firft burnt) like vermilion, and in tafte very falt and pungent. Great care and caution fhould be ufed in burning thefe afhes, and alfo in preferring them afterwards. The method of burning them is much the fame as burning charcoal. The peat muft be collected into a large heap, and covered fo as not to flame out, but fuffered to confume flowly, till the whole fubftance is burnt to an afh. The afhes thus burnt are held in moft efteem; but the peat-afhes burnt in common firing are in many places ufed for the fame purpofes, and fold at the fame prices.

Peat afhes are found excellent in fweetening four meadow land, deftroying rufhes, and other bad kinds of grafs, and in their ftead producing great quantities of natural grafs. They burn great quantities of peat-afhes in fome parts of Berkfhire and Lancashire, and efteem them one of the beft dreffings for their fpring crops.

The fuphureous and faline particles with which the afhes abound have a moft happy effect in promoting vegetation; and if ufed with difcretion, the increafe procured by them is truly wonderful.

Peat.

Peat. All ashes are of a hot, fiery, caustic nature: they must therefore be used with caution. With respect to peat-ashes, almost the only danger proceeds from laying them on in too great quantities at improper seasons. Nothing can be better than they are for dressing low damp meadows, laying to the quantity of from fifteen to twenty Winchester bushels on an acre: it is best to sow them by hand, as they will then be more regularly spread. This should be done in January or February at latest, that the ashes may be washed in towards the roots of the grass by the first rains that fall in the spring.

If they were spread more forward in the year, and a speedy rain should not succeed, being hot in their nature, they would be apt to burn up the grass, instead of doing it any service. The damper and colder the soil, the more peat-ashes should be laid on it; but in grass lands the quantity should never exceed thirty Winchester bushels, and on light warm lands less than half that quantity is fully sufficient.

On wheat crops, these ashes are of the greatest service, but they must be laid on with the utmost discretion. Were they to be spread in any quantity before the winter, after the sowing the corn, they would make the wheat too rank, and do more harm than good; was the spreading this manure, on the contrary, deferred till the spring, the corn could not possibly during the winter season be benefited by it. About the beginning of November, before the hard frosts set in, seems to be the proper season for this purpose: and it will be found necessary to sow on every acre of heavy clayey wheat land about eight Winchester bushels of these ashes; on lighter warmer lands in wheat, four will be sufficient for this season. The winter dressing is thought by practical farmers to be of great service: trifling as the quantity may seem, it warms the root of the plants, brings it moderately forward, preserves its verdure, and disposes it to get into a growing state the first fine weather after Christmas.

About the latter end of February, or the beginning of March, on heavy lands in wheat, another dressing of ashes, by sowing of them on every acre eight bushels more, will do much good; on light lands, in this second dressing, six bushels may be allowed.

These ashes laid on in the spring are of the greatest service, without any probability of danger: if rain falls within a few days after the dressing is laid on, it is washed in, and has a happy effect on the succeeding crop, co-operating with the manure that was laid on in November; if, on the contrary, dry weather for a long continuance succeeds, the first winter dressing has its full effect, and the quantity laid on in the spring is in fact so small, that there is very little probability of its burning or hurting the crop. This excellent manure is also of great use in the turnip husbandry on many accounts, particularly as it much contributes to preserve the young crop from being devoured by the fly.

But one of the principal advantages derived from these ashes, not yet mentioned, is the very great service they are of to every kind of artificial pasture.

Saintfoin receives great benefit from this manure, and so does clover, rye grass, and trefoil, provided it is laid on with discretion: the proper season is about the month of February. The quantity must be regulated by the nature of the crop and soil; but it ought

scarcely in any instance to exceed thirty Winchester bushels. Clover, with the help of this manure, grows with great luxuriance, inasmuch that there have often been two large crops of hay from the same field in a year, and good autumn feed afterwards. They have an excellent effect on tares or vetches: to pease they seem to be hurtful.

The effects of this manure will be visible at least three years, nor does it, like some others, leave the land in an impoverished state, when its virtues are exhausted and spent. Peat-ashes are not, however, so certain a manure for barley and oats as for the winter corn: for as these are quick growers, and occupy the land but a few months, this warm manure is often apt to push them forward too fast, and make them run too much to coarse straw, yielding only a lean immature grain. Oats, however, are not so apt to be damaged by it as barley.

Peat-ashes approach, in their effects on the several crops on which they are laid, to coal-foot; but two-thirds of the quantity that is used of foot will be sufficient of the ashes, as they are in a much stronger degree impregnated with a vegetative power; and they are besides in most places easier procured in quantities, and at a cheaper rate.

Peat-ashes are almost, as we have already observed, a general manure suited to every soil. On cold clay they warm the too compact particles, dispose it to ferment, crumble, and of course fertilize, and, in fine, not only assist it in disclosing and dispensing its great vegetative powers, but also bring to its aid a considerable proportion of ready prepared aliment for plants. On light lands these ashes have a different effect: here the pores are too large to be affected, or farther separated by the salts or sulphur contained in them; but, being closely attached to the surfaces of the large particles of which this earth is generally composed, this manure disposes them, by means of its salts, to attract the moisture contained in the air: by this operation, the plants which grow on these porous soils are prevented from being scorched up and burnt; and if they want, which they generally do, more nourishment than the land is of itself capable of affording, this is readily and abundantly supplied by this useful manure. In large farms it is very usual to see all the home-fields rich and well mended by the yard dung. &c. whereas the more distant lands are generally poor, unimproved, and out of heart, for want of proper manure being applied in time. See CHEMISTRY, n^o 1445.

PEAUCLIER, in anatomy, a name given by Winflow, in his Treatise on the Heart, and by some of the French writers, to the muscle called by *Albinus angustus colli*; and by others *detrabens quadratus*, and *quadratus gene*. Santorini has called the part of this which arises from the cheek *musculus risorius novus*; and some call the whole *platysma myoides*.

PEBBLES, the name of a genus of fossils, distinguished from the flints and homocroa by their having a variety of colours. These are defined to be stones composed of a crystalline matter debased by earths of various kinds in the same species, and then subject to veins, clouds, and other variegations, usually formed by incrustation round a central nucleus, but sometimes the effect of a simple concretion, and named like the agates, by the disposition which the motion of the

Peat
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Pebbles

Pebbles. the fluid they were formed in gave their differently coloured substances.

The variety of pebbles is so great, that an hasty describer would be apt to make almost as many species as he saw specimens. A careful examination will teach us, however, to distinguish them into a certain number of essentially different species, to which all the rest may be referred as accidental varieties. When we find the same colours, or those resulting from a mixture of the same, such as nature frequently makes in a number of stones, we shall easily be able to determine that these are all of them the same species, though of different appearances; and that whether the matter be disposed of in one or two, or in 20 cruts, laid regularly round a nucleus; or thrown irregularly, without a nucleus, into irregular lines; or lastly, if blended into an uniform mass.

These are the three states in which every pebble is found; for if it has been naturally and regularly formed by incrustation round a certain nucleus, we find that always the same in the same species, and the cruts not less regular and certain. If the whole has been more hastily formed, and the result only of one simple concretion, if that has happened while its different substances were all moist and thin, they have blended together and made a mixed mass of the joint colour of them all. But if they have been something harder when this has happened, and too far concreted to diffuse wholly among one another, they are found thrown together into irregular veins. These are the natural differences of all the pebbles; and having regard to these in the several variegations, all the known pebbles may be reduced to 34 species.

In all the strata of pebbles there are constantly found some which are broken, and of which the pieces lie very near one another; but as bodies of such hardness could not be broken without some considerable violence, their present situation seems to indicate that they have suffered that great violence in or near the places where they now lie. Beside these, we often meet with others which have as plainly had pieces broken off from them, though those pieces are nowhere to be found; whence it seems equally plain, that whatever has been the cause of their fracture, they have been brought broken, as we find them, from some other place, or else that the pieces broken from them must at some time or other have been carried from this place to some other distant one.

Several of these broken pebbles have their edges and corners so sharp and even, that it seems evident they never can have been tossed about or removed since the fracture was made; and others have their sides and corners so rounded, blunted, and worn away, that they seem to have been roughly moved and rolled about among other hard bodies, either with great violence, or for a very long continuance; since such hard bodies could not have been reduced to the condition in which we now see them without long friction. It may be supposed by some, that these stones never were broken, but have been naturally formed of this shape; but it will be easily seen, by any one who accurately surveys their veins or coats, which surround the nucleus, like the annular circles of a tree, that they must have been originally entire; and this will be the more plain if they are compared with a stone broken by art. Such

pebbles as are found in strata near the surface of the earth, are much more brittle than those which lie in deeper strata; and the more clear and transparent the sand is which is found among pebbles, the more beautiful the pebbles are generally observed to be.

The use of these stones, and their disposition in the earth, is a subject of great wonder; and may serve as one of the numerous proofs of an over-ruling Providence in the disposition of all natural bodies. The surface of the earth is composed of vegetable mould, made up of different earths mixed with the putrid remains of animal and vegetable bodies, and of the proper texture and compages for conducting the moisture to the roots of trees and plants. Under this are laid the sands and pebbles which serve as a sort of drain to carry off the redundant moisture deeper into the earth, where it may be ready to supply the place of what is constantly rising in exhalations; and lest the strata of sand should be too thick, it is common to find thin ones of clay between, which serve to put a stop to the descent of the moisture, and keep it from passing off too soon; and lest these thin strata of clay should yield and give way, and by their softness when wetted give leave to the particles of sand to blend themselves with, and even force their way through them, there are found in many places thin coats of a poor iron ore, placed regularly above and below the clay; and by these means not only strengthening and supporting the clay, but effectually keeping the sand from making its way into it. There are many people of opinion, that the swallowing of pebbles is very beneficial to health, in helping the stomach to digest its food; and a pebble-pesset is an old woman's medicine in the colic in many parts of England. They usually order the small white stones to be picked out of gravel walks for this purpose, and eat them in large quantities in some sort of spoon meat, of which milk is an ingredient.

The thing that has given occasion to this practice seems to have been, that people observe the birds to pick up the gravel, and that they are never well unless they have frequent recourse to this to help their digestion: but this is no similar case at all, for the gizzard or stomach of a bird is made very strong, because the creature hath no teeth to chew its food; and this gizzard is lined with a rough coat, by the help of which and these stones the food they swallow whole is so ground as to yield its juices to the nourishment of the animal. But the stomach of man is formed so very differently, that it can never require those assistances to the comminution of food. Many people have, however, accustomed themselves to swallow not only these small white stones, but large pebbles, even to the size of a walnut each; and these will often pass safely; and people who have long accustomed themselves to swallow them, boast of receiving no injury from them: we can never know, however, that the death of such persons is not owing to them at last; and as they can do no good, it is best always to avoid them. There are, indeed, instances on record in which they have undoubtedly done much mischief.

PECARY, in zoology. See **TAJACU**.

PECCANT, in medicine, an epithet given to the humours of the body, when they offend either in quantity or quality, *i. e.* when they are either morbid, or in too great abundance. Most diseases arise from peccant humours,

Pebbles
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Peccant.

hem
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Peck.

humours, which are either to be corrected by alteratives and specifics, or else to be evacuated.

PECHEM, in the materia medica, a name given by the modern Greek writers to the root called *behem* by Avicenna and Serapion. Many have been at a loss to know what this root pechem was; but the virtues ascribed to it are the same with those of the *behem* of the Arabians; its description is the same, and the division of it into white and red is also the same as that of the *behem*. Nay, the word *pechem* is only formed of *behem* by changing the *b* into a *p*, which is very common, and the aspirate into *z*, or *ch*, which is as common. Myrapius, who treats of this root, says the same thing that the Arabian Avicenna says of *behem*, namely, that it was the fragments of a woolly root, much corrugated and wrinkled on the surface, which was owing to its being so moist whilst fresh, that it always shrunk greatly in the drying.

PECHYAGRA, a name given by authors to the gout affecting the elbow.

PECHYS, a name used by some anatomical writers for the elbow.

PECHYTYRBE, an epithet used by some medical writers for the scurvy.

PECK, a measure of capacity, four of which make a bushel.

Peck (Francis), was born at Stamford in Lincolnshire, May 4th 1692, and educated at Cambridge, where he took the degrees of B. and M. A. He was the author of many works, of which the first is a poem, intitled, "Sighs on the Death of queen Anne;" printed probably about the time of her death in 1714. Two years afterwards he printed "TO TWOATION; or an Exercise on the Creation, and an Hymn to the Creator of the World; written in the express words of the sacred text, as an Attempt to show the Beauty and Sublimity of the Holy Scriptures, 1716, 8vo." In 1721, being then curate of King's Clifton in Northamptonshire, he issued proposals for printing the History and Antiquities of his native town, which was published in 1727, in folio, under the title of "*Academia urbis Aegthona; or the Antiquarian Annals of Stamford in Lincoln, Rutland, and Northamptonshires; containing the History of the University, Monasteries, Guilds, Churches, Chapels, Hospitals, and Schools there, &c.*" inscribed to John Duke of Rutland. This work was laden by "An Essay on the ancient and present State of Stamford, 1726, 4to," written by Francis Margrave, who, in his preface, mentions the difference which had arisen between him and Mr Peck, on account of the former's publication unfairly forestalling that intended by the latter. Mr Peck is also therein very roughly treated, on account of a small work he had formerly printed, intitled, "The History of the Stamford Bull-ringing." Mr Peck had before this time obtained the rectory of Godeby near Melton in Leicestershire, the only preferment he ever enjoyed. In 1730, he printed on a single sheet, "Queries concerning the Natural History and Antiquities of Leicestershire and Rutland," which were afterwards reprinted in 1740; but although the progress he had made in the work was very considerable, yet it never made its appearance. In 1732 he published the first volume of "*Dysiderata Curiosa*; or, a Collection of divers scarce and curious

Peck.

Pieces relating chiefly to Matters of English History; consisting of choice tracts, memoirs, letters, wills, epigrams, &c. transcribed, many of them, from the originals themselves, and the rest from divers ancient MS. copies, or the MS. collations of sundry famous antiquaries and other eminent persons, both of the last and present age: the whole, as nearly as possible, digested into order of time, and illustrated with ample notes, contents, additional discourses, and a complete index." This volume was dedicated to Lord William Manners, and was followed, in 1735, by a second volume, dedicated to Dr Reynolds Bishop of Lincoln. In 1735 Mr Peck printed in a 4to pamphlet, "A complete catalogue of all the discourses written both for and against popery in the time of King James II. containing in the whole an account of 457 books and pamphlets, a great number of them not mentioned in the three former catalogues; with references after each title, for the more freely finding a further account of the said discourses and their authors in sundry writers, and an alphabetical list of the writers on each side." In 1739 he was the editor of "Nineteen Letters of the truly reverend and learned Henry Hammond, D. D. (author of the Annotations on the New Testament, &c.) written to Mr Peter Stainrough and Dr Nathaniel Angelo, many of them on curious subjects, &c." These were printed from the originals, communicated by Mr Robert Mursden archdeacon of Nottingham, and Mr John Worthington. The next year, 1740, produced two volumes in 4to, one of them intitled, "Memoirs of the Life and Actions of Oliver Cromwell, as delivered in three panegyrics of him written in Latin; the first, as said, by Don Juan Rodriguez de Saa Meneses, Conde de Penguizo, the Portugal ambassador; the second, as assumed by a certain jesuit, the lord ambassador's chaplain; yet both, it is thought, composed by Mr John Milton (Latin secretary to Cromwell), as was the third; with an English version of each. The whole illustrated with a large historical preface; many similar passages from the *Paradise Lost*, and other works of Mr John Milton, and notes from the best historians. To all which is added, a collection of divers curious historical pieces relating to Cromwell, and a great number of other remarkable persons, after the manner of *Dysiderata Curiosa*, v. i. and ii.)" The other, "New Memoirs of the Life and poetical Works of Mr John Milton; with, first, an examination of Milton's style; and secondly, explanatory and critical notes on divers passages in Milton and Shakespear, by the editor. Thirdly, Baptistes; a sacred dramatic poem in defence of heresy, as written in Latin by Mr George Buchanan, translated into English by Mr John Milton, and first published in 1611, by order of the house of commons. Fourthly, the Parallel, or Archibishop Laud and Cardinal Wolsey compared, a Vision by Milton. Fifthly, the Legend of Sir Nicholas Throckmorton, knt. chief Butler of England, who died of poison, anno 1570, an historical poem by his nephew Sir Thomas Throckmorton, knt. Sixth, Herod the Great, by the editor. Seventh, the Resurrection, a poem in imitation of Milton, by a friend. And eighth, a Discourse on the Harmony of the Spheres, by Milton; with prefaces and notes." These were the last publications which

Pecora

Pecten

he gave the world. When these appeared, he had in contemplation no less than nine different works; but whether he had not met with encouragement for those which he had already produced, or whether he was rendered incapable of executing them by reason of his declining health, is uncertain; but none of them ever were made public. He concluded a laborious, and, it may be affirmed, an useful life, wholly devoted to antiquarian pursuits, Aug. 13th 1743, at the age of 61 years.

PECORA, in zoology, the fifth order of the class mammalia, in the Linnean system. See ZOOLOGY.

PECQUET (John), was a physician in Dieppe, and died at Paris in 1674. He was physician in ordinary to the celebrated Forquet, whom he entertained at his spare hours with some of the most amusing experiments in natural philosophy. He acquired immortal honour to himself by the discovery of a lacteal vessel, which conveys the chyle to the heart; and which from his name is called *le Reservoir de Pecquet*. This discovery was a fresh proof of the truth of the circulation of the blood: though it met with opposition from many of the learned, particularly from the famous Riolan, who wrote a treatise against the author of it, with this title: *Adversus Pecquetum & Pecquetianum*. The only works which we have of Pecquet, are, 1. *Experimenta nova anatomica*, published at Paris, 1654. 2. A Dissertation, *De Thoracis Lacteis*, published at Amsterdam, 1661. He was a man of a lively and active genius; but his sprightliness sometimes led him to adopt dangerous opinions. He recommended, as a remedy for all diseases, the use of brandy. This remedy, however, proved fatal to himself, and contributed to shorten his days, which he might have employed to the advantage of the public.

PECTEN, the SCALLOP; a genus of shell-fish, the characters of which are these: The animal is a tethys; the shell bivalve and unequal; the hinge toothless, having a small ovated hollow. This shell fish is one of the spinners, having the power of spinning threads like the mussels: but they are much shorter and coarser than even those of that fish; so that they can never be wrought into any kind of work like the longer and finer threads of the pinna marina. The use of the threads which are spun by the scallop is to fix the creature to any solid body near its shell. All these proceed, as in the mussel, from one common trunk. It is an evident proof that the fish has a power of fixing itself at pleasure to any solid body by means of these threads, that after storms the scallops are often found tossed upon rocks, where there were none the day before; and yet these are fixed by their threads, as well as those which had remained ever so long in their place. They form their threads in the very same manner which the mussel; only their organ which serves for spinning is shorter, and has a wider hollow, whence the threads are much sarily thicker and shorter.

Mr Barbut divides the genus ostrea into four families; which he thus names according to their characters. 1. The winged equilateral pectens. 2. The pectens, that have one ear inwardly, spring by being ciliated. 3. The pectens that have their valves more gibbous on one side than on the other. 4. The rough ones, commonly called *oysters*. Of the locomotive powers

of the pecten, we have already treated under the article *Animal Motion*, which see p. 411. col. 2.

The pectens, such as the sole pecten, the dural mantle pecten, the knotted, and others, seem to be in general inhabitants of the Indian seas; some of them frequent those of Africa and the South Seas. The most remarkable species is the *maximus* or great scallop, being the same with what Barbut calls the *dural mantle pecten*. It has 14 rays, very prominent and broad, and striated both above and below. They are rugged and imbricated with scales. They grow to a large size; are found in beds by themselves; are dredged up, and barrelled for sale. The ancients say that they have a power of removing themselves from place to place by vast springs or leaps. This shell was used both by the Greeks and Latins as a food. When dressed with pepper and cummin, it was taken medicinally. The scallop was commonly worn by pilgrims on their hat, or the cape of their coat, as a mark that they had crossed the sea in their way to the Holy Land, or some distant object of devotion.

The name *pecten* seems to have been given to these animals, from the longitudinal striae with which their surface is covered, which resemble somewhat the teeth of a comb; and hence also the Greek name *κτῆς*. By the general character of this shell, it evidently includes cockles as well as scallops, which are the pectens without ears, and having less flat or elated shells. They are called by all authors by a name which is only a diminutive of *pecten*, *pectunculus*. The having ears indeed is the common mark of distinction between the pectens and the cockles, which last usually have none; yet the genera are not distinct, as some have imagined: for there are shells universally allowed to be pectens or scallops, which have no ears, and others as universally allowed to be pectuncles or cockles which have. Hence then appears the error of Lister, who made them two distinct genera, and gave the ears and the equal convexity of both shells as the great characteristics of them: which, though they be good marks to distinguish the species by, are far from being so unalterable as to found different genera upon.

Barbut, we have seen, ranks the pectens under the genus ostrea; but he says, that though the generic character of the hinge agrees in both, the animal inhabiting the pectens is very different from that of the oyster; for which reason Linnæus has divided the genus into sections. The pectines by some are esteemed as delicious a food as the oyster. They differ very materially in a variety of circumstances. The pectens, as we have already observed, sail on the surface of the water; and besides, if they are attacked by a foe, they let down the membrane which nature has provided them for a sail, and drop to the bottom. "Behold (says Barbut) the splendor of the pectines, which rival the glowing colours of the papilionaceous tribe, as numerous as they are beautiful, stirring from place to place, and may well be called the papiliones of the ocean. What superior qualities does not the pectines enjoy above the ostrea edulis, which, constantly confined to its native bed, seems wholly destined to afford food to other creatures, not having any means of defence, but its shelly cattle, which is frequently attacked and stormed by its numerous enemies? This creature is not only useful to man as a dainty food, but the shell being le-

Pecten

Pecten. vigated into a subtle powder, is employed as an absorbent in heart-burns and other like complaints arising from acidities in the first passages; the hollow shells are generally made choice of, as containing more than the thinner flat ones, of the fine white earth, in proportion to the outer rough coat, which last is found to be considerably impregnated with sea-salt."

The grand mark of distinction between the *pectens* and oyster seems to be the locomotive faculty. It was long supposed, that the oyster possessed no power of motion, that it always remained in the place in which nature or accident had placed it, and that its life differed little from that of vegetables. Experience, however, has taught us to reject these premature conclusions. We shall here lay before our readers at length, though perhaps a little out of its place, what Abbé Dicquemare has observed with respect to this circumstance, the conclusions of whose remarks we have given in another place. See *Animal Motion*, p. 411. col. 2.

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"Passing one day (says the Abbé) along the sea-shore, I observed an oyster lying in a shallow place, and ejecting with considerable force a quantity of water. It immediately occurred to me, that, if this happened at a sufficient depth, the resistance of the water would have forced the oyster from its place. To be satisfied of this, I took several middle sized oysters with a light shell, and placed them on a smooth horizontal surface, in a sufficient quantity of pure sea-water. Some hours elapsed, and the night came on before any thing remarkable appeared; but next day I found one of the oysters in a place and situation different from that in which I had left it; and as nothing could have discomposed it, I could not doubt but that it had moved by its own powers. I continued, however, to attend my charge; but, as if they meant to conceal their secret, the oysters always operated in my absence. At last, as I was exploring the coast of Lower Normandy, I perceived in an oyster-bed one of them changing place pretty quickly. On my return, therefore, to Havre, I made new dispositions to discover the means by which the motions of oysters are performed, and I succeeded. This animal ejects the water by that part of the shell which is diametrically opposite to the hinge; it can also throw it out at the sides, at each extremity of the hinge, or even from the whole opening at once. For this purpose, it can vary the action of its internal mechanism; but the soft parts are not the only organs that perform this function; in certain cases the shells assist in forcing out the water.

"When an oyster thus suddenly, forcibly, and repeatedly, squirts forth a quantity of water, it repulses those of its enemies that endeavour to insinuate themselves within the shells while they are open: but this is effectual only against its weakest foe; for there are some so formidable by their strength or their address, that a great number of oysters perish in this way. The animal, therefore, endeavours with all its force to repel them; it does more, it retreats backwards, or starts aside in a lateral direction. All of them, however, are not placed in circumstances favourable for these motions. They are often situated in the crevices of rocks, between stones, or among other oysters, some in sand, and some in mud; so that their strength, or powers of

Pecten. motion, are exerted in vain. It is probable, however, that they have the faculty of operating their own relief from these circumstances, and that they may be accidentally assisted by other bodies. It must, however, be acknowledged, that the means of relief cannot be numerous or considerable in such as are attached to other oysters, to a body heavier than themselves, or to a rock; but such situations are the most uncommon in the oyster-beds that I am acquainted with on the French coasts in the Channel. Perhaps, indeed, a very angular or heavy shell may be sufficient to render an oyster immoveable. This is undoubtedly the case with such of them as have been obliged by worms, or other more formidable enemies, so to increase their shells as to make them thick and unwieldy. But we do not know whether these animals, in unfavourable circumstances, may not be able to supply those manœuvres that I have mentioned by others that I have not as yet been able to observe. An oyster that has never been attached, may fix itself by any part of the margin of either of its valves, and that margin will become the middle, or nearly so, if the oyster is young. I would not be surprised, that oysters, which have been fixed to a rock from the beginning, should be able to detach themselves. I have seen them operate upon their shells in so many different ways, and with such admirable contrivance, when those shells have been pierced by their enemies (among whom I must be ranked), that I do not think it at all impossible for them to quit the place to which they are attached. It will easily be imagined how delicate and difficult such observations and experiments must be, considering the sensibility of the animal, the delicacy of its organs, the transparency of the matter that forms the layers of its shells, the opacity of the shells themselves, the vicissitudes of the sea, and the seasons, &c. But it was of use to show, that, contrary to the opinion generally entertained by the learned as well as by fishermen, oysters are endowed with a locomotive faculty, and by what means that faculty is exerted. I must add, that those which first showed me these motions, were brought from the coasts of Bretagne, put into a bed at La Hogue, then at Courseulle, whence they were carried to Havre; and that, as all these transportations were made in a dry carriage, the oysters could not be in perfect vigour. It was necessary also to show, that these animals have much more sensation and more industry than is generally attributed to them.

"It is not often that a sagacious observer of nature is seduced from his object by the pride of appearing above it, or the desire of generalization. To think of grasping the whole of nature, when we are unable to consider in the whole the first and most interesting of her kingdoms, is a vain illusion. Yet some have endeavoured to confound the kingdoms, while they have taken the liberty of dividing the highest of them into beings differently animalized. Under the pretence of having a better idea of it, they lopped off all the extremities; that is to say, they rid themselves of every thing they were not well acquainted with, or that threw difficulties in their way. This, to be sure, was very convenient, but very unsuitable to the growing of an enlarged mind, and very unfit to fit us up with regard to the economy of nature. The organization of the oyster, though very different from that

Pectoral
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Peculiar.

with which we are best acquainted, may be comprehended under our considerations of the animal economy in general. Those authors are not so enlightened as they imagine, who represent the oyster as an animal deprived of sensation, as an intermediate being between animals and vegetables, as a plant, and even in some respects as inferior to a plant. It is thus that the oyster has been made a foundation for many an absurd hypothesis with respect to the nature of animals. But let us quit the consideration of these faithless pictures, and attend to the original.

"The oyster is conscious of its existence, and conscious also that something exists exterior to itself. It chooses, it rejects; it varies its operations with judgment, according to circumstances; it defends itself by means adequate and complicated; it repairs its losses; and it can be made to change its habits. Oysters newly taken from places which the sea had never left, inconsiderately open their shells, lose the water they contain, and die in a few days: but those that have been taken from the same place, and thrown into beds or reservoirs from which the sea occasionally retires, where they are incommoded by the rays of the sun, or by the cold, or where they are exposed to the injuries of man, learn to keep themselves close when they are abandoned by the water, and live a much longer time." See OSTREA.

PECTORAL, a sacerdotal habit or vestment, worn by the Jewish high-priest. The Jews called it *Hoshchen*, the Greeks *δορυς*, the Latins *rationale* and *pectorale*, and in our version of the Bible it is called *breastplate*. It consisted of embroidered stuff, about a span square, and was worn upon the breast, set with twelve precious stones, ranged in four rows, and containing the names of the twelve tribes. It was fastened to the shoulder by two chains and hooks of gold. God himself prescribed the form of it. See BREASTPLATE.

PECTORALE, a breastplate of thin brass, about 12 fingers square, worn by the poorer soldiers in the Roman army, who were rated under 1000 drachmæ. See LORICA.

PECTORAL, an epithet for medicines good in diseases of the breast and lungs.

PECTORALIS, in ANATOMY. See there, *Table of the Muscles*.

PECULATE, in civil law, the crime of embezzling the public money, by a person intrusted with the receipt, management, or custody thereof. This term is also used by civilians for a theft, whether the thing be public, fiscal, sacred, or religious.

PECULIAR, in the canon law, signifies a particular parish or church that has jurisdiction within itself for granting probates of wills and administrations, exempt from the ordinary or bishop's courts. The king's chapel is a royal peculiar, exempt from all spiritual jurisdiction, and referred to the visitation and immediate government of the king himself. There is likewise the archbishop's peculiar: for it is an ancient privilege of the see of Canterbury, that wherever any manors or advowsons belong to it, they forthwith become exempt from the ordinary, and are reputed peculiars: there are 57 such peculiars in the see of Canterbury.

Besides these, there are some peculiars belonging to deans, chapters, and prebendaries, which are only exempted from the jurisdiction of the archdeacon: these

are derived from the bishop, who may visit them, and Peculium to whom there lies an appeal.

Court of PECULIARS, is a branch of, and annexed to, the court of ARCHES. It has a jurisdiction over all those parishes dispersed through the province of Canterbury in the midst of other dioceses, which are exempt from the ordinary's jurisdiction, and subject to the metropolitan only. All ecclesiastical causes, arising within these peculiar or exempt jurisdictions, are originally cognizable by this court: from which an appeal lay formerly to the pope, but now by the stat. 25 H. VIII. c. 19. to the king in chancery.

PECULIUM, the stock or estate which a person, in the power of another, whether male or female, either as his or her slave, may acquire by his industry. Roman slaves frequently amassed considerable sums in this way. The word properly signifies the advanced price which a slave could get for his master's cattle, &c. above the price fixed upon them by his master, which was the slave's own property.

In the Romish church, peculium denotes the goods which each religious reserves and possesses to himself.

PEDALS, the largest pipes of an organ, so called because played and stopped with the foot. The pedals are made square, and of wood; they are usually 13 in number. They are of modern invention, and serve to carry the sounds of an octave deeper than the rest. See ORGAN.

PEDAGOGUE, or PÆDAGOGUE, a tutor or master, to whom is committed the discipline and direction of a scholar, to be instructed in grammar and other arts. The word is formed from the Greek *παιδων κηγος*, *puerorum duitor*, "leader of boys."

M. Fleury observes, that the Greeks gave the name *pedagogus* to slaves appointed to attend their children, lead them, and teach them to walk, &c. The Romans gave the same denomination to the slaves who were intrusted with the care and instruction of their children.

PEDANT, a schoolmaster or pedagogue, who professes to instruct and govern youth, teach them the humanities, and the arts. See PEDAGOGUE.

PEDANT is also used for a rough, unpolished man of letters, who makes an impertinent use of the sciences, and abounds in unseasonable criticisms and observations.

Dacier defines a pedant, a person who has more reading than good sense. See PEDANTRY.

Pedants are people ever armed with quibbles and syllogisms, breathe nothing but disputation and chicanery, and pursue a proposition to the last limits of logic.

Malebranche describes a pedant as a man full of false erudition, who makes a parade of his knowledge, and is ever quoting some Greek or Latin author, or hunting back to a remote etymology.

St Evremont says, that to paint the folly of a pedant, we must represent him as turning all conversation to some one science or subject he is best acquainted withal.

There are pedants of all conditions, and all robes. Wicquefort says, an ambassador, always attentive to formalities and decorums, is nothing else but a political pedant.

PEDANTRY, or PEDANTISM, the quality or manner of a pedant. See PEDANT.

Pedarian
||
Pedizean.

To swell up little and low things, to make a vain show of science, to heap up Greek and Latin, without judgment, to tear those to pieces who differ from us about a passage in Suetonius or other ancient authors, or in the etymology of a word, to stir up all the world against a man for not admiring Cicero enough, to be interested for the reputation of an ancient as if he were our next of kin, is what we properly call *pedantry*.

PEDARIAN, in Roman antiquity, those senators who signified their votes by their feet, not with their tongues; that is, such as walked over to the side of those whose opinion they approved of, in divisions of the senate.

Dr Middleton thus accounts for the origin of the word. He says, that though the magistrates of Rome had a right to a place and vote in the senate both during their office and after it, and before they were put upon the roll by the censors, yet they had not probably a right to speak or debate there on any question, at least in the earlier ages of the republic. For this seems to have been the original distinction between them and the ancient senators, as it is plainly intimated in the formulæ of the consular edict, sent abroad to summon the senate, which was addressed to all senators, and to all those who had a right to vote in the senate. From this distinction, those who had only a right to vote were called in ridicule *pedarian*; because they signified their votes by their feet, not their tongues, and upon every division of the senate went over to the side of those whose opinion they approved. It was in allusion to this old custom, which seems to have been wholly dropt in the latter ages of the republic, that the mute part of the senate continued still to be called by the name of *pedarians*, as Cicero informs us, who in giving an account to Atticus of a certain debate and decree of the senate upon it, says that it was made with the eager and general concurrence of the *pedarians*, though against the authority of all the consulars.

PEDATURA, a term used, in Roman antiquity, for a space or proportion of a certain number of feet set out. This word often occurs in writers on military affairs: as in Hyginus de Castrametatione we meet with *meminerimus itaque ad computationem cohortis equitæ miliaria pedaturam ad mille trecentos sexaginta dari debere*; which is thus explained: The *pedatura*, or space allowed for a *cohort equitata* or provincial cohort, consisting of both horse and foot, could not be the same as the *pedatura* of a uniform body of infantry, of the same number, but must exceed it by 360 feet; for the proportion of the room of one horseman to one foot soldier he assigns as two and a half to one.

PEDERASTS, the same with SODOMITES.

PEDESTAL, in architecture, the lowest part of an order of columns, being that part which sustains the column, and serves it as a foot or stand. See COLUMN.

PEDIEAN, in Grecian antiquity. The city of Athens was anciently divided into three different parts; one on the descent of an hill; another on the sea-shore; and a third in a plain between the other two. The inhabitants of the middle region were called Πεδιαιον, *Pedizeans*, formed from πῶδιον, "plain," or "flat;" or as Aristotle will have it, *Pediaci*: those

of the hill, *Diacrians*; and those of the shore, *Paralians*.

Pedicle,
Pediculus.

These quarters usually composed so many different factions. Pisistratus made use of the *Pedizeans* against the *Diacrians*. In the time of Solon, when a form of government was to be chosen, the *Diacrians* chose it democratic; the *Pedizeans* demanded an aristocracy; and the *Paralians* a mixed government.

PEDICLE, among botanists, that part of a stalk which immediately sustains the leaf of a flower or a fruit, and is commonly called a *footstalk*.

PEDICULUS, the Louse, in zoology, a genus of insects belonging to the order of aptera. It has six feet, two eyes, and a sort of sting in the mouth; the feelers are as long as the thorax; and the belly is depressed and sublobated. It is an oviparous animal. They are not peculiar to man alone, but infest other animals, as quadrupeds and birds, and even fishes and vegetables; but these are of peculiar species on each animal, according to the particular nature of each, some of which are different from those which infest the human body. Nay, even insects are infested with vermin which feed on and torment them. Several kinds of beetles are subject to lice; but particularly that kind called by way of eminence the *lousy beetle*. The lice on this are very numerous, and will not be shook off. The earwig is often infested with lice, just at the setting on of its head: these are white, and shining like mites, but they are much smaller; they are round-backed, flat-bellied, and have long legs, particularly the foremost pair. Snails of all kinds, but especially the large naked sorts, are very subject to lice; which are continually seen running about them, and devouring them. Numbers of little red lice, with a very small head, and in shape resembling a tortoise, are often seen about the legs of spiders, and they never leave the animal while he lives; but if he is killed, they almost instantly forsake him. A sort of whitish lice is found on humble-bees; they are also found upon ants; and fishes are not less subject to them than other animals.

Kircher tells us, that he found lice also on flies, and M. de la Hire has given a curious account of the creature which he found on the common fly. Having occasion to view a living fly with the microscope, he observed on its head, back, and shoulders, a great number of small animals crawling very nimbly about, and often climbing up the hairs which grow at the origin of the fly's legs. He with a fine needle took up one of these, and placed it before the microscope used to view the animalcules in fluids. It had eight legs; four on each side. These were not placed very distant from each other; but the four towards the head were separated by a small space from the four towards the tail. The feet were of a particular structure, being composed of several fingers, as it were, and fitted for taking fast hold of any thing; but the two nearest the head were also more remarkable in this particular than those near the tail; the extremities of the legs for a little way above the feet were dry and void of flesh like the legs of birds, but above this part they appeared plump and fleshy. It had two small horns upon its head, formed of several hairs arranged closely together; and there were some other clusters of hairs by the side of these

Pediculus horns, but they had not the same figure; and towards the origin of the hinder legs there were two other such clusters of hairs which took their origin at the middle of the back. The whole creature was of a bright yellowish red; the legs, and all the body, except a large spot in the centre, were perfectly transparent. In size, he computed it to be about $\frac{1}{2}$ length part of the head of the fly; and he observes, that such kind of vermin are rarely found on flies.

The louse which infests the human body makes a very curious appearance through a microscope. It has such a transparent shell or skin, that we are able to discover more of what passes within its body than in most other living creatures. It has naturally three divisions, the head, the breast, and the tail part. In the head appear two fine black eyes, with a horn that has five joint, and is surrounded with hairs standing before each eye; and from the end of the nose or snout there is a pointed projecting part, which serves as a sheath or she to a piercer or sucker, which the creature thrusts into the skin to draw out the blood and humours which are its destined food; for it has no mouth that opens in the common way. This piercer or sucker is judged to be 700 times smaller than a hair, and is contained in another case within the first, and can be drawn in or thrust out at pleasure. The breast is very beautifully marked in the middle; the skin is transparent, and full of little pits; and from the under part of it proceed six legs, each having five joints, and their skin all the way resembling shagreen, except at the ends where it is smoother. Each leg is terminated by two claws, which are hooked, and are of an unequal length and size. These it uses as we would a thumb and middle finger; and there are hairs between these claws as well as all over the legs. On the back part of the tail there may be discovered some ring-like divisions, and a sort of marks which look like the strokes of a rod on the human skin; the belly looks like shagreen, and towards the lower end it is very clear, and full of pits: at the extremity of the tail there are two semicircular parts all covered over with hairs, which serve to conceal the anus. When the louse moves its legs, the motion of the muscles, which all unite in an oblong dark spot in the middle of the breast, may be distinguished perfectly, and so may the motion of the muscles of the head when it moves its horns. We may likewise see the various ramifications of the veins and arteries, which are white, with the pulsus regularly beating in the arteries. But the most surprising of all the sights is the peristaltic motion of the guts, which is continued all the way from the stomach down to the anus.

If one of these creatures, when hungry, be placed on the back of the hand, it will thrust its sucker into the skin, and the blood which it sucks may be seen passing in a fine stream to the fore-part of the head; where, falling into a roundish cavity, it passes again in a fine stream to another circular receptacle in the middle of the head; from thence it runs through a small vessel to the breast, and then to a gut which reaches to the hinder part of the body, where in a curve it turns again a little upward; in the breast and gut the blood is moved without intermission, with a great force; especially in the gut, where it occasions such a contraction of the gut as is very surprising. In the

upper part of the crooked ascending gut above-mentioned, the propelled blood stands still, and seems to undergo a separation, some of it becoming clear and waterish, while other black particles are pushed forward to the anus. If a louse is placed on its back, two bloody darkish spots appear; the larger in the middle of the body, the lesser towards the tail; the motions of which are followed by the pulsation of the dark bloody spot, in or over which the white bladder seems to lie. This motion of the systole and diastole is best seen when the creature begins to grow weak; and on pricking the white bladder, which seems to be the heart, the creature instantly dies. The lower dark spot is supposed to be the excrement in the gut.

Lice have been supposed to be hermaphrodites: but this is erroneous; for Mr. Liewenhoeck observed, that the males have stings in their tails, which the females have not. And he supposes the smarting pain which those creatures sometimes give, to be owing to their stinging with these stings when made uneasy by pressure or otherwise. He says, that he felt little or no pain from their suckers, though six of them were feeding on his hand at once.

In order to know the true history and manner of breeding of these creatures, Mr. Liewenhoeck put two female lice into a black stocking, which he wore night and day. He found, on examination, that in six days one of them had laid above 50 eggs; and, upon dissecting it, he found as many yet remaining in the ovary: whence he concludes, that in 12 days it would have laid 100 eggs. These eggs naturally hatch in six days, and would then probably have produced 50 males, and as many females; and these females coming to their full growth in 18 days, might each of them be supposed after 12 days more to lay 100 eggs; which eggs, in six days more, might produce a young brood of 5000: so that in eight weeks, one louse may see 5000 of its own descendants.

Signior Rhedi, who has more attentively observed these animals than any other author, has given several engravings of the different species of lice found on different animals. Men, he observes, are subject to two kinds; the common louse and the crab-louse. He observes also, that the size of the lice is not at all proportioned to that of the animal which they infest; since the starling has them as large as the swan.

Some kinds of constitutions are more apt to breed lice than others: and in some places of different degrees of heat, they are certain to be destroyed upon people who in other climates are over-run with them. It is an observation of Oviedo, that the Spanish sailors, who are generally much afflicted with lice, always lose them in a certain degree of latitude in their voyages to the East Indies, and have them again on their returning to the same degree. This is not only true of the Spaniards, but of all other people who make the same voyage; for though they set out ever so lousy, they have not one of those creatures by the time they come to the tropic. And in the Indies there is no such thing as a louse about the body, though the people be ever so nasty. The sailors continue free from these creatures till their return; but in going back, they usually begin to be lousy after they arrive at the latitude of the Madeira islands. The extreme sweats, which the working people naturally fall into
between

Pediluvium between the latitude of Madeira and the Indies, drown and destroy the lice; and have the same effect as the rubbing over the lousy heads of children with butter and oil. The sweat, in these hot climates, is not rank as in Europe, and therefore it is not apt to breed lice; but when people return into latitudes where they sweat rank again, their nastiness subjects them to the same visitations of these vermin as before. The people in general in the Indies are very subject to lice in their heads, tho' free from them on their bodies. The reason of this is, that their heads sweat less than their bodies, and they take no care to comb and clean them. The Spanish negroes wash their heads thoroughly once every week with soap, to prevent their being lousy. This makes them escape much better than the other negroes who are slaves there; for the lice grow so numerous in their heads, that they often eat large holes in them.

Cleanliness is doubtless the grand secret by which to keep clear from lice, especially when we wear woollen clothes. It is also necessary where there is any danger, to take nourishing, succulent food, and to use wholesome drink. J. Mercurial advises frequent purges as a cure in the pedicular disease: it is necessary also to rub with garlic and mustard, to take treacle inwardly, also salted and acid food, to bathe, and to foment the body with a decoction of lupines, or of gall nuts; but the most effectual remedies are sulphur and tobacco, mercurial ointment, black pepper, and vinegar. Monkeys and some Hottentots, we are told, eat lice; and are thence denominated *phthiropages*. On the coast of the Red Sea it is reported, that there is a nation of small stature and of a black colour, who use locusts for the greatest part of their food, prepared only with salt. On such food those men live till 40, and then die of a pedicular or lousy disease. A kind of winged lice devour them, their body putrefies, and they die in great torment. It is also a fact that the negroes on the west coast of Africa take great delight in making their women clear their bodies of lice, and those latter devour them with greediness as fast as they find them.

In ancient medicine lice were esteemed aperient, febrifuge, and proper for curing a pale complexion. The natural repugnance to those ugly creatures (says Lemery) perhaps contributed more to banish the fever than the remedy itself. In the jaundice five or six were swallowed in a soft egg. In the suppression of urine, which happens frequently to children at their birth, a living louse is introduced into the urethra, which, by the tickling which it occasions in the canal, forces the sphincter to relax, and permits the urine to flow. A bug produces the same effect. Farriers have also a custom (says M. Bourgeois) of introducing one or two lice into the urethra of horses when they are seized with a retention of urine, a disease pretty common among them. But, according to the Continuation of the *Materia Medica*, to use the pedicular medicine with the greatest advantage, one would need to be in Africa, where those insects are carefully sought after and swallowed as a venereal morsel. The great distinction between those which infect mankind is into the head and body louse. The former is hard and high coloured, and the latter less compact and more of an ashen colour. If it were

possible to give a reason why some families of the same species stick to the head and others to the clothes, &c. it would also in all probability be possible to understand the nature of many contagious diseases.

PEDILUVIUM, or BATHING of the FEET. The uses of warm bathing in general, and of the pediluvium in particular, are so little understood, that they are often preposterously used, and sometimes as injudiciously abstained from.

In the Edinburgh Medical Essays, we find an ingenious author's opinion of the warm pediluvium, notwithstanding that of Borelli, Boerhaave, and Hoffman, to the contrary, to be, That the legs becoming warmer than before, the blood in them is warmed: this blood rarifying, distends the vessels; and in circulating imparts a great degree of warmth to the rest of the mass; and as there is a portion of it constantly passing through the legs, and acquiring new heat there, which heat is in the course of circulation communicated to the rest of the blood, the whole mass rarifying, occupies a larger space, and of consequence circulates with greater force. The volume of the blood being thus increased, every vessel is distended, and every part of the body feels the effects of it; the distant parts a little later than those first heated. The benefit obtained by a warm pediluvium is generally attributed to its making a derivation into the parts immersed, and a revulsion from those affected, because they are relieved; but the cure is performed by the direct contrary method of operating, viz. by a greater force of circulation through the parts affected, removing what was stagnant or moving too sluggishly there. Warm bathing is of no service where there is an irremediable obstruction, though, by its taking off from a spasm in general, it may seem to give a moment's ease; nor does it draw from the distant parts, but often hurts by pushing against matter that will not yield with a stronger impetus of circulation than the stretched and diseased vessels can bear: so that where there is any suspicion of scirrhus, warm bathing of any sort should never be used. On the other hand, where obstructions are not of long standing, and the impacted matter is not obstinate, warm baths may be of great use to resolve them quickly. In recent colds, with slight humoral peripneumonies, they are frequently an immediate cure. This they effect by increasing the force of the circulation, opening the ram, and driving freely through the lungs that lentor which stagnated or moved slowly in them. As thus conducing to the resolution of obstructions, they may be considered as febrile and safe fevers; and in using them we imitate nature, which by a fever often carries off an obstructing cause of a chronical ailment. Borelli, Boerhaave, and Hoffman, are all of opinion, that the warm pediluvium acts by driving a larger quantity of blood into the parts immersed. But arguments must give way to facts: the experiments related in the Medical Essays seem to prove to a demonstration, that the warm pediluvium acts by rarifying the blood.

A warm pediluvium, when moderately tempered, may be used as a safe cordial, by which circulation can be roused, or a gentle fever raised; with this advantage over the common and faltering, that the effect of them may be taken off at pleasure.

Pediluvium.

Pediment

||
Pedro.

Pediluvia are sometimes used in the small pox; but Dr Stevenfon thinks their frequent tumultuous operations render that suspected, and at best of very doubtful effect; and he therefore prefers Monf. Martin of Laufanne's method of bathing the skin, not only of the legs, but of the whole body, with a soft cloth dipped in warm water, every four hours, till the eruption; by which means the pustules may become universally higher, and consequently more safe.

PEDIMENT. See ARCHITECTURE, p. 240, &c.

PEDLAR, a travelling foot-trader. See HAWKERS.

In Britain (and formerly in France) the pedlars are despised; but it is otherwise in certain countries. In Spanish America, the business is so profitable, that it is thought by no means dishonourable; and there are many gentlemen in Old Spain, who, when their circumstances are declining, send their sons to the Indies to retrieve their fortunes in this way. Almost all the commodities of Europe are distributed through the southern continent of America by means of these pedlars. They come from Panama to Paita by sea; and in the road from the port last mentioned, they make Peura their first voyage to Lima. Some take the road through Caxamalia; others through Truxillo, along shore from Lima. They take their passage back to Panama by sea, and perhaps take with them a little cargo of brandy. At Panama they again stock themselves with European goods, returning by sea to Paita, where they are put on shore; there they hire mules and load them, the Indians going with them in order to lead them back. Their travelling expences are next to nothing; for the Indians are brought under such subjection, that they find lodging for them, and provender for their mules, frequently thinking it an honour done them for their guests to accept of this for nothing, unless the stranger now and then, out of generosity or compassion, makes a small recompence.

In Poland, where there are few or no manufactures, almost all the merchandise is carried on by pedlars, who are said to be generally Scotsmen, and who, in the reign of king Charles II. are said to have amounted to no fewer than 53,000.

PEDOMETER, or **PODOMETER,** formed from *πῦς, pes,* "foot," and *μέτρον,* "measure," way-wiser; a mechanical instrument, in form of a watch, consisting of various wheels with teeth, catching in one another, all disposed in the same plane; which, by means of a chain or string fastened to a man's foot, or to the wheel of a chariot, advance a notch each step, or each revolution of the wheel; so that the number being marked on the edge of each wheel, one may number the paces, or measure exactly the distance from one place to another. There are some of them which mark the time on a dial-plate, and are in every respect much like a watch, and are accordingly worn in the pocket like a watch.

PEDRO (Don) of Portugal, duke of Coimbra, was the fourth child and second surviving son of King John of Portugal, and was born March the 4th 1394. His father gave him an excellent education, which, joined to strong natural abilities and much application, rendered him one of the most accomplished princes of his time. He was not only very learned himself, but a great lover of learning, and a great patron

of learned men. It was chiefly with a view to improve his knowledge that he spent four years in travelling through different countries in Europe, Asia, and Africa, with a train suitable to his quality; of which travels there is a relation still extant, but so loaded with fabulous circumstances, that it wounds the reputation it was designed to raise. At his return he espoused Isabella, daughter to the count of Urgel, and grand-daughter to Don Pedro, the fourth king of Portugal, which was esteemed a very great advancement of his fortune. He was elected into the most noble order of the Garter, April 22. 1417, in the fifth year of the reign of his cousin Henry V. grandson of John of Gaunt, by the father's side, as our duke of Coimbra was by the mother. In 1440 he was declared regent during the minority of his cousin Don Alonso V. son of king Edward, who died by the plague. He found some difficulty at first in the discharge of his office, both from the queen-mother and others. But upon the whole, his administration was so mild and so just, that the magistrates and people of Lisbon concurred in demanding his leave to erect a statue to him. The regent thanked them, said he should be unwilling to see a work of their's demolished; and that he was sufficiently rewarded by this public testimony of their affections. The queen dowager wished to raise disturbances in Portugal by aiming to recover the regency to herself; but the steadiness of the regent's administration, the attachment of the best part of the nobility to him, and his enjoying, in so absolute a degree, the confidence of the people; not only secured the interior tranquillity of the state, but raised the credit likewise of the crown of Portugal to a very great height in the sentiments of its neighbours: for in the course of his regency he had made it his continual study to pursue the public good; to ease the people in general, and the inhabitants of Lisbon in particular, of several impositions; to maintain the laws in their full vigour; to give the king an excellent education; and if that had been at all practicable, to diffuse a perfect unanimity through the court, by assuaging the malice and envy of his enemies. The king when he came of age, and the cortes or parliament, expressed their entire satisfaction with the regent's administration; and all parties entirely approved of the king's marriage with Donna Isabella, the regent's daughter, which was celebrated in 1446. The enmity of his enemies, however, was not in the least abated by the regent's being out of office. They still persecuted him with their unjust calumnies, and unfortunately made the king hearken to their falsehoods. The unfortunate duke, when ordered to appear before the king, was advised to take with him an escort of horse and foot. In his passage he was proclaimed a rebel, and quickly after he was surrounded by the king's troops. Soon after he was attacked, and in the heat of action he was killed: nor was the envy of his enemies even then satiated; his body was forbid burial; and was at length taken away privately by the peasants. His virtue, however hated in courts, was adored by the uncorrupt part of his countrymen. At length, tho', by an inspection of his papers, the king saw, when it was too late, the injustice that had been done the man who had behaved so well in so high and difficult an office; and whose papers only discovered signs of further benefit

Pedro.

Peduncle, to the king and his dominions. In consequence of these discoveries, the duke's adherents were declared loyal subjects, all prosecutions were ordered to cease, and the king desired the body of Coimbra to be transported with great pomp from the castle of Abrantes to the monastery of Batalha; where it was interred in the tomb which he had caused to be erected for himself. The royal name of Don Pedro occurs often in the history of Portugal, and many who bore the name were singularly distinguished either for internal abilities, or external splendor. See PORTUGAL.

PEDUNCLE, in botany. See **PEDICLE**.

PEEBLES, or **TWEEDALE**, a county of Scotland, extending 25 miles in length and 18 in breadth. It is bounded on the east by Ettrick Forest, on the south by Annandale, on the west by Clydesdale, and on the north by Mid Lothian. Tweeddale is a hilly country, well watered with the Tweed, the Yarrow, and a great number of smaller streams that fertilize the valleys, which produce good harvests of oats and barley, with some proportion of wheat. All the rivers of any consequence abound with trout and salmon. The lake called *West Water Loch* swarms with a prodigious number of eels. In the month of August, when the west wind blows, they tumble into the river Yarrow in such shoals, that the people who wade in to catch them run the risk of being overturned. There is another lake on the borders of Annandale, called *Loch-gennen*, which forms a cataract over a precipice 250 paces high: here the water falls with such a momentum as to kill the fish underneath. About the middle of this country is the hill or mountain of Braidsb, from the top of which the sea may be seen on each side of the island. Tweeddale abounds with limestone and freestone. The hills are generally as green as the downs in Sussex, and feed innumerable flocks of sheep, that yield great quantities of excellent wool. The country is well shaded with woods and plantations, abounds with all the necessities of life, and is adorned with many fine seats and populous villages. The earls of March were hereditary sheriffs of Tweeddale, which bestows the title of *marquis* on a branch of the ancient house of Hay, earls of Errol, and hereditary high constables of Scotland. The family of Tweeddale is, by the female side, descended from the famous Simon de Frazer, proprietor of great part of this country, who had a great share in obtaining the triple victory at Roslin. The chief, and indeed the only town of consequence in Tweeddale, is **PEEBLES**, a small inconsiderable royal borough, and seat of a presbytery, pleasantly situated on the banks of the Tweed, over which there is at this place a stately stone bridge of five arches. In the neighbourhood of Peebles, near the village of Romana, on the river Lene, we see the vestiges of two Roman castles, or stationary forts; and a great many terraces on the neighbouring hills, which perhaps have served as itinerary encampments. In the shire of Tweeddale there are many ancient and honourable families of the gentry. Among these, Douglas of Cavers, who was hereditary sheriff of the county, still preserves the standard and the iron mace of the gallant lord Douglas, who fell in the battle of Otterburn, just as his troops had defeated and taken Henry Percy, surnamed *Hotspur*. In the churchyard of Drumelzier, belonging to an ancient branch

of the Hay-family, the famous Merlin is supposed to lie buried. There was an old traditional prophecy, that the two kingdoms should be united when the waters of the Tweed and the Pansel should meet at his grave. Accordingly, the country people observe that this meeting happened in consequence of an inundation at the accession of James VI. to the crown of England.

PEEK, in the sea-language, is a word used in various senses. Thus the anchor is said to be a-peek, when the ship being about to weigh comes over her anchor in such a manner that the cable hangs perpendicularly between the hause and the anchor.

To heave a peek, is to bring the peek so as that the anchor may hang a-peek. A ship is said to ride a-peek, when lying with her main and fore-yards hoisted up, one end of her yards is brought down to the shrouds, and the other raised up on end; which is chiefly done when she lies in rivers, lest other ships falling foul of the yards should break them. Riding a-broad peek, denotes much the same, excepting that the yards are only raised to half the height.

Peek is also used for a room in the hold, extending from the bitts forward to the stern: in this room men of war keep their powder, and merchant-men their victuals.

PEEL, in the Isle of Man, formerly Holm-town, has a fort in a small island, and a garrison well supplied with cannon. In it are the ancient cathedral, the lord's house, with some lodgings of the bishops, and some other remains of antiquity.

PEER, in general, signifies an equal, or one of the same rank and station: hence in the acts of some councils, we find these words, *with the consent of our peers, bishops, abbots, &c.* Afterwards the same term was applied to the vassals or tenants of the same lord, who were called *peers*, because they were all equal in condition, and obliged to serve and attend him in his courts; and peers *in fiefs*, because they all held fiefs of the same lord.

The term *peers* is now applied to those who are impannelled in an inquest upon a person for convicting or acquitting him of any offence laid to his charge: and the reason why the jury is so called, is because, by the common law and the custom of this kingdom, every person is to be tried by his peers or equals; a lord by the lords, and a commoner by commoners. See the article **JURY**.

PEER of the Realm, a noble lord who has a seat and vote in the House of Lords, which is also called the *House of Peers*.

These lords are called *peers*, because though there is a distinction of degrees in our nobility, yet in public actions they are equal, as in their votes in parliament, and in trying any nobleman or other person impeached by the commons, &c. See **PARLIAMENT**.

House of PEERS, or *House of Lords*, forms one of the three estates of parliament. See **LORDS** and **PARLIAMENT**.

In a judicative capacity, the house of peers is the supreme court of the kingdom, having at present no original jurisdiction over causes, but only upon appeals and writs of error; to rectify any injustice or mistake of the law committed by the courts below. To this authority they succeeded of course upon the dissolution

Peek
||
Pecr.

Peers
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Pegasus.

of the *Antia Regia*. For as the barons of parliament were constituent members of that court, and the rest of its jurisdiction was dealt out to other tribunals, over which the great officers who accompanied those barons were respectively delegated to preside, it followed, that the right of receiving appeal, and superintending all other jurisdictions, still remained in that noble assembly, from which every other great court was derived. They are therefore in all cases the last resort, from whose judgment no farther appeal is permitted; but every subordinate tribunal must conform to their determinations: The law reposing an entire confidence in the honour and confidence of the noble persons who compose this important assembly, that they will make themselves masters of those questions upon which they undertake to decide; since upon their decision all property must finally depend. See LORDS, NOBILITY, &c.

PEERS, in the anti-revolution government of France, were twelve great lords of that kingdom; of which six were dukes and six counts; and of these, six were ecclesiastics and six laymen: thus the archbishop of Rheims, and the bishop of Laon and Langres, were dukes and peers; and the bishops of Chalons on the Marne, Noyons, and Beauvais, were counts and peers. The dukes of Burgundy, Normandy, and Aquitaine, were lay peers and dukes; and the counts of Flanders, Champagne, and Toulouse, lay peers and counts. These peers assisted at the coronation of kings, either in person or by their representatives, where each performed the functions attached to his respective dignity: but as the six lay peerages were all united to the crown, except that of the count of Flanders, six lords of the first quality were chosen to represent them: but the ecclesiastical peers generally assisted in person. The title of peer was lately bestowed on every lord whose estate was erected into a peerage; the number of which, as it depended entirely on the king, was uncertain.

PEERESS, a woman who is noble by descent, creation, or marriage. For, as we have noblemen of several ranks, so we may have noblewomen; thus king Henry VIII. made Anne Bullen marchioness of Pembroke; king James I. created the Lady Compton, wife to Sir Thomas Compton, countess of Buckingham, in the lifetime of her husband, without any addition of honour to him; and also the same king made the Lady Finch, viscountess of Maidstone, and afterwards countess of Winchelsea, to her and the heirs of her body: and king George I. made the Lady Schu- lenberg, duchess of Kendal.

If a peeress, by descent or creation, marries a person under the degree of nobility, she still continues noble: but if she obtains that dignity only by marriage, she loses it, on her afterwards marrying a commoner; yet by the courtesy of England, she generally retains the title of her nobility.

A countess or baroness may not be arrested for debt or trespass; for though in respect of their sex, they cannot sit in parliament, they are nevertheless peers of the realm, and shall be tried by their peers, &c.

PEWIT, in ornithology. See LARUS.

PEGASUS, among the poets, a horse imagined to have wings; being that whereon Bellerophon was

fallen to be mounted when he engaged the Chimera. See CHIMERA.

The opening of the fountain Hippocrene on mount Helicon is ascribed to a blow of Pegasus's hoof. It was supposed to have flown away to heaven, where it became a constellation. Hence

PEGASUS, in astronomy, the name of a constellation of the northern hemisphere, in form of a flying horse. See ASTRONOMY, n^o 405.

PEGMARES, a name by which certain gladiators were distinguished, who fought upon moveable scaffolds called *pegmata*, which were sometimes unexpectedly raised, and by this means surprised the people with gladiators in hot contention. They were sometimes so suddenly lifted up as to throw the combatants into the air; and sometimes they were let down into dark and deep holes, and then set on fire, thus becoming the funeral-piles of these miserable wretches; and roasting them alive to divert the populace.

PEGU, a very considerable kingdom of Asia, beyond the Ganges. The country properly so called is but about 300 miles in length from north to south, and as much in breadth from east to west. It is situated on the eastern side of the bay of Bengal, nearly opposite to Arizax, and to the north-east of the coast of Coromandel. It is bounded on the north by the kingdoms of Arrakan and Ava; on the east by the Upper and Lower Siam; on the south by part of Siam and the sea; and on the west by the sea and part of Arrakan.

The kingdom of Pegu is said to have been founded about 1100 years ago. Its first king was a seaman; concerning whom and his successors we know nothing till the discovery of the East Indies by the Portuguese in the beginning of the 16th century. In 1518 the throne of Pegu was possessed by one Bressagukan, with whom Antony Correa the Portuguese ambassador solemnly concluded a peace in 1519. This monarch was possessed of a very large and rich empire, nine kingdoms being in subjection to him, whose revenues amounted to three millions of gold. We hear no farther account of his transactions after the conclusion of the treaty with the Portuguese. In 1539 he was murdered on the following occasion: Among other princes who were his tributaries was Para Mandera, king of the Barmas. These people inhabited the high lands called *Pangavirau*, to the northward of the kingdom of Pegu. Their prince, by one of the terms of his vassalage, was obliged to furnish the king of Pegu with 30,000 Barmas, to labour in his mines and other public works. As the king used frequently to go and see how his works went forward, and in these journeys took along with him none but his women, the Barmas observing these visits frequently repeated, formed a design of robbing the queen and all the concubines of their jewels; and pursuant to this design, the next time the king visited the works, they murdered him, and having stripped the ladies, fled to their own country.

By this enormity all Pegu was thrown into confusion: but, instead of revenging the death of their king, the people divided everywhere into factions; so that Dacha Rupi, the lawful heir to the crown, found himself unable to maintain his authority. Of these commotions, the king of the Barmas taking the advantage,

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vantage, not only shook off the yoke, but formed a design of conquering the kingdom of Pegu itself. With this view he invaded the country with an army of more than a million of foot, and 5000 elephants; besides a great fleet which he sent down the river Ava towards Bégou or Pegu, the capital of the empire; while he himself marched thither by land. Just at this time Ferdinand de Miralles arrived at Pegu from Goa with a large galleon richly laden on account of the king of Portugal. As soon as Dacha Rupi heard of his coming, he sent to desire his assistance against the enemy. This he obtained by great presents and promises: and Miralles, setting out in a galliot, joined the king's ships. Had the numbers been any thing near an equality, the superior skill of Miralles would undoubtedly have gained the victory: But the fleet of the Barmas covered the whole river, though as large as the Ganges, while that of Dacha Rupi could scarce be observed in comparison with them. Miralles did every thing that man could do, and even held out alone after the natives had deserted him; but at last, oppressed and overwhelmed with numbers, he was killed, with all his men.

Thus Para Mandara became master of all Pegu; after which he attacked the tributary kingdoms. In 1524 he besieged Martavan, the capital of a kingdom of the same name, then very great and flourishing. The land-forces which he brought against it consisted of 700,000 men, while by sea he attacked it with a fleet of 1700 sail; 100 of which were large galleys, and in them 700 Portuguese commanded by John Cayero, who had the reputation of being a valiant and experienced officer. The siege, however, continued seven months, during which time the Barmas lost 120,000 men; but at last the besieged king, finding himself straitened for want of provisions, and unable to withstand so great a power, offered terms of capitulation. The besiegers would admit of no terms, upon which the distressed king applied to the Portuguese in the service of his enemy; for by their assistance he doubted not to be able to drive away the Barmas. Accordingly, he sent one Seixas to Cayero, intreating him to receive himself, his family, and treasure, on board the four ships he had under his command; offering, on that condition, to give half his riches to the king of Portugal, to become his vassal, and pay such tribute as should be agreed upon. Cayero consulted the principal officers, and in their presence asked Seixas what he thought the treasure might amount to. Seixas answered, that out of what he had seen, for he had not seen all, two ships might be loaded with gold, and four or five with silver. This proposal was too advantageous to be rejected; but the rest of the officers envying the great fortune which Cayero would make, threatened to discover the whole to the king of Barmas if he did not reject it. The unhappy king of Martavan had now no other resource but to set fire to the city, make a fury, and die honourably with the few men he had with him: but even here he was disappointed; for by the desertion of 4000 of his troops the enemy were apprised of his design, and prevented it. Thus betrayed, he capitulated with the Barma king for his own life and the lives of his wife and children, with leave to end his days in retirement. All this was readily granted, but the

conqueror intended to perform no part of his promise. The city was plundered and burnt, by which above 60,000 persons perished, while at least an equal number were carried into slavery. Six thousand cannon were found in the place; 100,000 quintals of pepper, and an equal quantity of other spices. The day after this destruction, 21 gibbets were erected on an hill adjoining to the city: on which the queen, her children, and ladies, were executed, by hanging them up alive by the feet: however, the queen expired with anguish before she suffered such a cruel indignity. The king, with 50 of his chief lords, was cast into the sea, with stones about their necks. This monstrous cruelty so provoked the tyrant's soldiers, that they mutinied, and he was in no small danger of suffering for it: however, he found means to pacify them; after which he proceeded to besiege Prom, the capital of another kingdom. Here he increased his army to 900,000 men. The queen by whom it was governed offered to submit to be his vassal; but nothing would satisfy the Barma monarch less than her surrender at discretion, and putting all her treasure into his hands. This she, who knew his perfidy, refused to do; on which the city was fiercely assaulted, but greatly to the disadvantage of the Barmas, who lost near 100,000 men. However, the city was at last betrayed to him, when Mandara behaved with his usual cruelty. Two thousand children were slain, and their bodies cut in pieces and thrown to the elephants; the queen was stripped naked, publicly whipped, and then tortured, till she died; the young king was tied to her dead body, and both together cast into a river, as were also 300 other people of quality.

While the tyrant was employed in fortifying the city, he was informed, that the prince of Ava had sailed down the river Queytor with 400 rowing vessels having 30,000 soldiers on board; but that, he ring of the queen's disaster, he stopped at Melatay, a strong fortress about 12 leagues north of Prom, where he waited to be joined by his father the king of Ava with 80,000 men. On this news the Barma king sent his foster-brother Chaumigrem along the river side with 20,000 men, while he himself followed with 100,000 more. The prince in this emergency burnt his barks, forming a vanguard of the mariners, and, putting his small army in the best position he could, expected the enemy. A most desperate engagement ensued, in which only 500 of the prince's army were left, and 115,000 out of 200,000 Barmas who opposed him were killed. The 500 Avans retired into the fort: but Mandara coming up soon after, and being enraged at the terrible havoc made in his army, attacked the fortress most violently for seven days; at the end of which time, the 500, finding themselves unable to hold out any longer, rushed out in a dark and rainy night, in order to save their lives at as dear a rate as possible. This last effort was so extremely violent, that it broke through the enemy's troops in several places, and even passed so hard on the king himself, that he was forced to jump into the river. However, they were at last all cut off, but not before they had destroyed 12,000 of their enemies.

Mandara having thus become master of the fort, commanded it to be immediately repaired; and sailed up the river to the port of Ava, about a league from

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the capital, where he burnt between 2000 and 3000 vessels, and lost in the enterprise about 8000 men. The city itself he did not think proper to invest, as it had been newly fortified, was defended by a numerous garrison, and an army of 80,000 men was advancing to its relief. The king also, apprehensive of Mandara's power, had implored the protection of the emperor Siam; offering to become his tributary on condition that he would assist him with his forces in recovering the city of Prom. To this the emperor readily assented; which news greatly alarmed the Barma monarch, so that he dispatched ambassadors to the Kalaminhm or sovereign of a large territory adjacent, requesting him to divert the emperor from his purpose. On the ambassadors return from this court, it appeared that the treaty had already taken effect; but as the season was not yet arrived for invading Ava, Chaumigrem the king's foster-brother was sent with 150,000 men to reduce Sebadi or Savadi the capital of a small kingdom about 130 leagues north-east from Pegu. The general, however, failed in his attempt; and afterwards endeavouring to revenge himself on a town in the neighbourhood, he was surprised by the enemy and put to flight.

In the meantime, the empire of Siam fell into great distractions; the king, together with the heir to the crown, were murdered by the queen, who had fallen in love with an officer, whom she married after her husband's death. However, both of them were soon after killed at an entertainment; and the crown was given to a natural brother of the late king, but a coward and a tyrant. On this Mandara resolved to invade the country; and, his principal courtiers concurring in the scheme, he collected an army of 80,000 men, with no fewer than 20,000 elephants. In this army were 1000 Portuguese, commanded by one James Suarez, who already had a pension of 200,000 ducats a year from the king of Pegu, with the title of his brother, and governor of the kingdom. With this formidable army he set out in April 1548. His first achievement was the taking of a fortress on the borders of the enemy's country; before which, being several times repulsed, and having lost 3000 of his men, he revenged himself by putting all the women to the sword. He next besieged the capital itself; but though the siege was continued for five months, during which time the most violent attacks were made upon it, the assailants were constantly repulsed with great loss. However, it was still resolved to continue the siege; and a mount of earth was raised, on which were placed 40 pieces of cannon, ready to batter it anew, when, in October, advice was received of a rebellion having broke out in Pegu.

The person who headed the rebels on the present occasion was Shoripam Shay, near a kin to the former monarch slain twelve years before. He was a religious person, of great understanding, and esteemed a saint. As he was a famous preacher, he made a sermon, in which he set forth the tyranny of the Barmas in such a manner, that he was immediately taken out of the pulpit, and proclaimed king by the people, who, as a token of sovereignty, gave him the title of *Shemindoo*. The first act of sovereignty which he executed was to cut in pieces 15,000 Barmas, and seize on the treasure: and so agreeable was this

change of government to all ranks of people, that in three weeks time all the strong holds of Pegu fell into his hands.

On this news the king immediately raised the siege in which he was engaged, and in 17 days got to Martavan. Here he was informed, that Shemindoo had posted 500,000 men in different places, in order to intercept his passage; at the same time that he had the mortification to find 50,000 of his best troops deserted. To prevent a greater desertion, after 14 days stay, he departed from Martavan, and soon met Shemindoo at the head of 600,000 men. A desperate engagement followed; in which Shemindoo was entirely defeated, with the loss of 300,000 men. Of the Barma troops were slain 60,000; among whom were 280 Portuguese.

The morning after this victory, the tyrant marched to the city; the inhabitants of which surrendered, on condition of having their lives and effects spared. The kingdom being thus again brought under his subjection, his next step was to punish the principal persons concerned in the rebellion: their heads he cut off, and confiscated their estates, which amounted to no less than ten millions of gold. Others say, that he put all without distinction to the sword, excepting only 12,000, who took shelter in James Suarez's house; that alone affording an asylum from the general slaughter. The plunder was incredible, Suarez alone getting three millions. All these cruelties, however, were insufficient to secure the allegiance of the tyrant's subjects: for in less than three months news was brought that the city of Martavan had revolted; and that the governor had not only declared for Shemindoo, but murdered 2000 Barmas. Mandara then summoned all the lords of the kingdom to meet him with their force, within 15 days, at a place called *Mouchau*, not far from his capital, whither he himself went with 300 men, to wait their arrival. But in the meantime he received intelligence that the shemin or governor of Zatan, a city of some consequence, had submitted to Shemindoo, and also lent him a large sum of gold. The shemin was immediately sent for in order to be put to death: but he, suspecting Mandara's design, excused himself by pretending sickness; after which, having consulted with his friends, he drew together about 600 men; and having with these privately advanced to the place where the king was, he killed him, with the few attendants that were about him at the time. The guards in the court being alarmed with the noise, a skirmish ensued with the shemin's men, in which about 800 were slain on both sides, most of them Barmas. The shemin then retreated to a place called *Pontel*; whither the people of the country, hearing of the death of the king, who was universally hated, resorted to him. When he had assembled about 5000 men, he returned to seek the troops which the late king had with him; and finding them dispersed in several places, easily killed them all. With the Barmas were slain 80 out of 300 Portuguese. The remainder surrendered, with Suarez their leader; and were spared, on condition of their remaining in the service of the shemin.

The shemin, now finding his forces daily increase, assumed the title of *king*; and, to render himself the more popular, gave out that he would exterminate
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the Barmas so effectually, as not to leave one in all the kingdom. It happened, however, that one of those who were with the late king at the time he was murdered, escaped the general slaughter; and, swimming over the river, informed Chaumigrem of the king's death. He had with him 180,000 men, all of them natives of Pegu, excepting 30,000 Barmas. He knew very well, that if the natives had known that the king was dead, he and all his Barmas would have instantly been put to the sword. Pretending, therefore, that he had received orders to put garrisons into several places, Chaumigrem dispatched all the natives into different parts; and thus got rid of those whom he had so much cause to fear. As soon as they were marched, he turned back upon the capital, and seized the king's treasure, together with all the arms and ammunition. He then set fire to the magazines, arsenals, palace, some of whose apartments were ceiled with gold, and 2000 rowing vessels which were on the river. Then destroying all the artillery, he fled with the 30,000 Barmas to his own country, being pursued in vain by the natives of Pegu.

Thus the shemin of Zatan was left in quiet possession of the kingdom; but, by his repeated acts of tyranny and cruelty, he so disgusted his subjects, that many fled to foreign countries, while others went over to Shemindoo, who began now to gather strength again. In the mean time, James Suarez, the Portuguese whom we have often mentioned, lost his life by attempting to ravish a young woman of distinction; the shemin being unable to protect him, and obliged to give him up to the mob, who stoned him to death. The shemin himself did not long survive him; for, being grown intolerable by his oppressions, most of his followers abandoned him, and he was besieged in his capital by Shemindoo with an army of 200,000 men, and soon after slain in a sally: so that Shemindoo now seemed to be fully established on the throne. But in the mean time Chaumigrem, the foster-brother to the deceased king, hearing that Pegu was very ill provided with the means of defence, invaded the kingdom with an army of 300,000 men. Shemindoo met him with three times their number; but his men, being all natives of Pegu, were inferior in strength, notwithstanding their numbers, to the enemy. The consequence was, that Shemindoo was defeated with prodigious slaughter, and Chaumigrem caused himself to be proclaimed king of Pegu. Shortly after, Shemindoo himself was taken; and, after being treated with the utmost cruelty, was beheaded.

The history of Chaumigrem is very imperfect. However, we know that he was a very great conqueror, and not at all inferior in cruelty to his predecessors. He reduced the empire of Siam and Arrakan, and died in 1583; being succeeded by his son named *Pranjinoko*, then about 50 years of age. When this prince ascended the throne, the kingdom of Pegu was in its greatest height of grandeur; but by his tyranny and obstinacy he lost all that his father had gained. He died in 1599, and after his death the kingdom of Pegu became subject to Arrakan. For some time past it has been tributary to the more powerful kingdom of Ava; the sovereigns of which country have hitherto been extremely cautious of permitting Europeans to obtain any settlement among them.

The air of Pegu is very healthy, and presently recovers sick strangers. The soil also is very rich and fertile in corn, rice, fruit, and roots; being enriched by the inundations of the river Pegu, which are almost incredible, extending above 30 leagues beyond its channel. It produces also good timber of several kinds. The country abounds with elephants, buffaloes, goats, hogs, and other animals, particularly game; and deer is so plenty in September and October, that one may be bought for three or four pence: they are very fleshy, but have no fat. There is store of good poultry; the cocks are vastly large, and the hens very beautiful. As for fish, there are many sorts, and well tasted. In Pegu are found mines, not only of gold, iron, tin, and lead, or rather a kind of copper or mixture of copper and lead, but also of rubies, diamonds, and sapphires. The rubies are the best in the world; but the diamonds are small, and only found in the craws of poultry and pheasants. Besides, only one family has the privilege of felling them; and none dare open the ground to dig for them. The rubies are found in a mountain in the province of Kablan, or Kapelan, between the city of Pegu and the port of Sirian.

The inhabitants are of an olive, or rather a tawny complexion. The women are branded by some travellers as having shook off all modesty, on account of their exposing some parts of their bodies which ought to be concealed from sight. Some also tell us, that the men wear bells, which at a certain age, *viz.* 25 or 30, or, according to others, when they are capable of making use of women, are inserted on each side the virile member between the skin and the flesh, which is opened for that purpose, and healed in seven or eight days. The Peguers may be ranked among the most superstitious of all mankind. They maintain and worship crocodiles; and will drink nothing but the waters of the ditches where those monstrous animals harbour. By thus exposing themselves to the manifest hazard of their lives, they have frequently the misfortune to be devoured. They have five principal festivals in the year, called *sapans*, which they celebrate with extraordinary magnificence. In one of them the king and queen make a pilgrimage about 12 leagues from the city, riding on a triumphal car, so richly adorned with jewels, that it may be said without an hyperbole that they carry about with them the value of a kingdom. This prince is extremely rich; and has in the chapel of his palace idols of inestimable value, some of them being of massy gold and silver, and adorned with all sorts of precious stones. The talapoins, or priests of this country, have no possessions; but such is the respect paid them by the people, that they are never known to want. They preach to them every Monday not to commit murder; to take from no person any thing belonging to him; to do no hurt; to give no offence; to avoid impurity and superstition; but above all, not to worship the devil; but these discourses have no effect in the least respect. The people, attached to manicheism, believe that all good comes from God; that the devil is the author of all the evil that happens to men; and that therefore they ought to worship him, that he may not afflict them. This is a common notion among the Indian idolaters.

The inhabitants of Pegu are accused by some authors with being slovenly in their houses, and dirty in their

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diet, on account of their seasoning their viſuals with fiſh, a compoſition made of ſtinking fiſh, reduced to a conſiſtency like mud, ſo nauſeous and offensive that not but the Indians can endure the ſmell of it. Balbi ſays, he could not ſuffer the ſcent of ſtinking carrion, and yet ſometimes they ſeaſon their rice, and other food, with ſmell of ſtinking butter. As they have no wheat in this country, their bread is rice made into cakes. Their common drink is water, or liquor distilled from coconut water. They are ſpirited and warlike people; open, generous, and hoſpitable; and have neither national pride nor the jealouſy of moſt other eaſtern nations.

The men here, as in moſt eaſtern countries, buy their wives, or pay their parents a dowry for them. They have an odd cuſtom; which is to offer their daughters to ſtrangers, and hire them out for a time: ſome ſay they hire out their wives in the ſame manner. Theſe marriages for a time are well regulated, and often prove very beneficial to the occasional huſband. Moſt of the foreigners who trade hither, marry a wife for the time of their ſtay. In caſe of a ſeparation, the father is obliged to take care of the boys, and the mother of the girls. We are told that no woman is looked upon the worse, but rather the better, for having had ſeveral European huſbands: nay, we are told, that no perſon of ſuch rank in Pegu, from the gentleman to the king, will marry a maiden, till ſome acquaintance or ſtranger has had the firſt night's lodging with her.

In Pegu, the ſupremacy of all land is in the king: he is likewiſe the heir of all his ſubjects who die without iſſue; but in caſe they have children, two-thirds go to them, and the reſt to his majeſty.

In the government of this country, deſpotiſm prevails in its full extent, and deſpotiſm too of the very worſt kind; for the inhabitants are under the abſolute power of a ſet of petty tyrants, who are themſelves nothing more than ſlaves to the king of Ava. As they have little or no emolument, except what they can raiſe by extortion, it is exerciſed in the moſt unlimited manner. They take cognizance of all diſputes between individuals that come to their ears, without the caſe being laid before them by either of the parties; and on whatever ſide the caſe is determined, there is a never-failing charge brought in againſt both, for juſtice, as they expreſs it; and this price of juſtice is often three or four times greater than the value of the matter in agitation.

But the inconveniences that this government labours under are not only thoſe of deſpotiſm; the unhappy ſubjects feel thoſe of anarchy too. There are about twenty perſons concerned in the government of Rangoon, who, though one is ſubordinate to another, and though matters of the firſt conſequence are determined in a council of the whole, can yet act ſeparately; and any one member of this body can by his own authority give out orders, which no inhabitant of Pegu dares to diſobey. Thoſe orders may be contrary to the ſenſe of the whole body; in which caſe they are, indeed, reverſed in council: but then there are inſtances, and

the party aggrieved, or any effectual meaſures taken to prevent ſuch a contempt of authority for the future."

When a perſon falls ſick, we are told that they generally make a vow to the devil, from whom they believe all evil comes. Then a ſcaffold is built, and viſuals are ſpread on the top of it to ſolace Old Nick, and render him propitious. This feaſt is accompanied with lighted candles and muſic; and the whole is managed by an undertaker called the *devil's father*.

The commodities exported from this country are gold, ſilver, rubies, muſk, benzoin, long-pepper, tin, lead, copper; lakka, or gamboge, whereof they make hard wax; rice: rice-wine; and ſome ſugar-canes, of which they would have plenty, but that the elephants eat them. It may be obſerved, that under the name of *rubies*, the Peguers compute topazes, ſapphires, amethyſts, and other ſtones; which they diſtinguiſh by ſaying the blue, the violet, and the yellow rubies. The true ruby is red, transparent, or ſparkling, inclining near the ſurface to the violet of the amethyſt. Cotton cloths from Bengal and Coromandel, with ſome ſtriped ſilks, are beſt for the Pegu market, and ſilver of any ſort will go off there: for the king, in return for his eight and a half per cent. duty on it, allows the merchants to melt it down, and put what copper alloy they pleaſe in it. They wear none of our European commodities in Pegu but hats and ribbons. The gentry will give extravagant prices for fine heavier hats, which they wear without any cocks. They are no leſs fond of ribbons ſtrewed with gold and ſilver, which they wear round their hats.

As to the religion of the Peguers, it is the ſame at bottom with that which prevails over the reſt of India and Tibet; only varies in dreſs ſomewhat in different countries, according to the humour or intereſt of the prieſts. They hold the exiſtence of one ſupreme God, of whom they make no image; but they have many inferior created gods, whole images are ſet up in the temples for the laity to worſhip. Not content with theſe, we are told they worſhip the devil alſo. Many are ſeen to run about the ſtreets every morning, with rice in one hand and a torch in the other, crying aloud, that they are going to give the devil his breakfaſt, that he may not hurt them all the day. Beſides the manichean doctrine of two principles, one the author of good and the other of evil, from whence their worſhipping the devil has its riſe, they believe an eternal ſucceſſion of worlds without creation. The Peguers hold the doctrine of the Metemphychoſis, or tranſmigration of the human ſoul, which, after paſſing through the bodies of various animals, ſhall attain to the perfection and felicity of their gods; which in effect is no other than a ſtate of annihilation. They have a ſtrong opinion of the ſanctity of apes and crocodiles, inſomuch that they believe the perſons to be perfectly happy who are devoured by them. Their temples are of a conic form, and ſome of them a quarter of a mile round. They obſerve a great many feſtivals, ſome of which are called *Japan*. The images of their inferior gods are in a ſitting poſture, with their legs acroſs, and toes of equal length: their arms and hands very ſmall in proportion to their bodies; their faces longer than human; their ears long, and the lappets very thick. The congregation bow to them when they come in and

* Hunter's
account of the
kingdom of
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Peguntium when they go out; and that is all the worship which they pay to them. The priests of Pegu, called *talapouts*, are a sort of mendicant friars. They observe celibacy; and eat but once a-day; living in the woods, in a sort of nests or cages built on the tops of trees for fear of the tygers. They preach frequently, lead very innocent lives, and are very hospitable and humane.

The king of Pegu's revenues arise chiefly from the rent of lands, of which he is the sole proprietor. Another branch of it are the duties paid for the commodities imported or exported. In a word, he is judged the richest monarch in the world, next to the emperor of China.

PEGUNTUM (anc. geog.), Ptolemy; *Piguntiae*, (Pliny); a town or citadel of Dalmatia, on the Adriatic, opposite to the island Brattia, scarce five miles off, and 40 miles to the east of Salonae. According to Fortis, a mountain, a large hollow, and submarine springs are seen here. "This hollow (says he) seems to have been excavated by some ancient river. The springs which bubble up from under the sea are so considerable, that they might pass for the rising again of a river sunk under ground. Vrullia has the same derivation as the word *Vrül*, which in Slavonian signifies a fountain; and this etymology, rendering the name of Vrullia the *Berullia* of Porphyrogenitus analogous to that of Peguntium, since *Urv* and *Vrül* are synonymous, induces me to believe, that the castle named Peguntium by ancient geographers was situated in this place, and not at the mouth of the Cattina. No remarkable vestiges of antiquity now exist on the spot; yet it is evident, by the quantity of fragments of vases, tiles, and sepulchral inscriptions now and then dug up, that this tract of coast was well inhabited in the Roman times. The principal cause why the tracts of ancient habitations cannot be discovered about Vrullia, is the steepness of the hill above it, and the quantity of stones brought down from thence by the waters. The mouth of the hollow of Vrullia is dreaded by seamen, on account of the sudden impetuous gusts of wind that blow from thence, and in a moment raise a kind of hurricane in the channel between the Primorie and the island of Brazza, to the great danger of barks surprised by it."

PEINE FORT IT DURE, (Lat. *pæna fortis et dura*), signifies a special punishment inflicted on those who, being arraigned of felony, refuse to put themselves on the ordinary trial, but stubbornly stand mute; it is vulgarly called *pressing to death*. See **ARRAIGNMENT**.

PEIRCE (James), an eminent dissenting minister, was born at Wapping, in London, in the year 1674, and was educated at Utrecht and Leyden; after which he spent some time at Oxford, in order to enjoy the benefit of frequenting the Bodleian library. He then for two years preached the Sunday-evening's lecture at the meeting house in Miles-Lane, London, and then settled at Cam'bridge. In 1713 he was removed to a congregation at Exeter, where he continued till the year 1718: when the Calvinists among the dissenters proposing a subscription to articles of faith to be signed by all the dissenting ministers in the kingdom, several articles were proposed to him and Mr John Hallet, another dissenting minister at Exeter, in order to their subscribing them, they both refused, imagining this proceeding of their dissenting brethren to be an unworthy imposition on religious liberty and private

judgment; for which they were ejected from their congregation. Upon this, a new meeting was opened for them at Exeter, of which Mr Peirce continued minister till his death, in 1726. He was a man of the strictest virtue, exemplary piety, and great learning. He wrote, 1. *Exercitatio philosophica de Homine et Animæ natura*. 2. Thirteen pieces on the Controversy between the Church of England and the Dissenters. 3. Ten pieces on the Controversy about the Ejectment at Exeter. 4. Six pieces on the Doctrine of the Trinity. 5. A Paraphrase and Notes on the Epistles of St Paul to the Colossians, Philippians, and Hebrews. 6. An Essay in favour of giving the Eucharist to Children. 7. Fourteen Sermons.

PEIRESC (Nicolas Claude Fabri), born in 1580, was descended from an ancient and noble family, seated originally at Pisa in Italy. At ten years of age, he was sent to Avignon, where he spent five years in the Jesuits college, in the study of what in Scotland and on the Continent is called *humanity*. From Avignon he was, in 1595, removed to Aix, and entered upon the study of philosophy. In the interim, he attended the proper masters for dancing, riding, and handling arms; in all which, though he performed the lessons regularly, it was with reluctance: for this being done only to please an uncle, whose heir he was to be, he never practised by himself, esteeming all the time lost that was not spent in the pursuits of literature. During this period, his father being presented with a medal of the emperor Arcadius, which was found at Belgenfer, Peiresc begged the favour of it; and, charmed with deciphering the characters in the exergue, and reading the emperor's name, he carried the medal with a transport of joy to his uncle; who for his encouragement gave him two more, together with some books upon the subject. This is the epoch of his application to antiquities, for which he became afterwards so famous. In 1596, he was sent to finish his course of philosophy under the Jesuits at Tournon, where he turned his attention particularly to cosmography, as being necessary to the understanding of history, abating, however, nothing of his application to antiquity, in which he was much assisted by Petrus Rogerus, one of the professors, and a skilful medalist: nor did he omit the study of humanity in general, wherein he was the master and instructor of a brother who was with him. But to do all this he was obliged to sit up late at nights; and so much labour and attention, as he was naturally of a tender constitution, increased the weakness of his stomach formerly contracted, and for which he had used a kind of digestive powder. Being recalled by his uncle in 1597, he returned to Aix, and entered there upon the study of the law; which he prosecuted, however, so as to find leisure to visit and converse frequently with Peter A. R. Bagarr, a most skilful antiquary, who was afterwards made master of the jewels to Henry IV.

The following year he went again to Avignon, to carry on his course of law under one Peter David; who, being well skilled likewise in antiquities, was pleased to see Peiresc join this study to that of the law. But Ghibertus of Naples, auditor to Cardinal Aquaviva, fed his curiosity the most, in showing him some rarities, such as he had never seen before. Ghibertus also lent him Geltrius's *Treasure upon Coins*, and advised

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vifed him to go into Italy, efpecially to Rome, where he would meet with curiofities to fatisfy his moft ardent wifhes. Accordingly, his uncle having procured a proper governor, he and his brother fet out upon that tour Sept. 1599; and paffing through Florence, Bononia, and Ferrara, when he had ftayed a few days at Venice, he fixed his refidence at Padua, in order to complete his courfe of law. But once a quarter, going to Venice to get cafh for bills of exchange, he took thefe opportunities of introducing himfelf to the moft diftinguifhed literati there; and was particularly careffed by F. Contarin, procurator of St Mark, who was poffeffed of a curious cabinet of medales, and other antiquities, without knowing the value of them. This was fully fhown to him by Peirefc, who likewife explained the Greek infcriptions upon his medals, and the monumental ftones. After a year's ftay at Padua, he fet out for Rome, and arrived there Oct. 1600, in order to be in time for feeing the jubilee: to celebrate which, the Porta Sancta would be opened in the beginning of the next year. He paffed fix months in this city, viewing the numberlefs curiofities there, and in cultivating the friendship of Galileo, by whom he was much beloved. This friendship led him to carry his recherches into aftronomy and natural philofophy; and he was prefent when Fabricius ab Aquapendente, out of a parcel of eggs upon which a hen was fitting, took one every day, to obferve the gradual formation of the chick from firft to laft. From this time it was generally acknowledged, that he had taken the helm of learning into his hand, and began to guide the commonwealth of letters.

Having now fpent almoft three years in Italy, he began to prepare for his departure; and in the end of 1602, having packed up all the rarities, gems, &c. which he had procured, and put them into the road to Marseilles, he left Padua, and, croffing the Alps to Geneva, went to Lyons; where receiving money, he made a handsome prefent to his governor, who took the route of Paris. From Lyons he went to Montpellier, to improve himfelf in the law under Julius Parius. From Montpellier he difpatched more rarities to his uncle, who fending for him home, he arrived at Aix in November; but, bringing Parius along with him, he obtained leave to return to Montpellier in a few days. He waited upon Parius back again, under whom he continued purfuing his law ftudies till the end of 1603, when he returned to Aix, at the earneft request of his uncle, who, having refigned to him his fenatorial dignity, had ever fince the beginning of the year laboured to get the king's patent. The degree of doctör of law was a neceffary qualification for that dignity. Peirefc, therefore, having kept the ufual exercife, took that degree Jan. 18. 1604, when the aforefaid patent was given in to the fenate, and ordered to be recorded: yet Peirefc procured leave not to be prefently entered into the list of fenators. The bent of his inclination was not fo much to bufinefs as to advance arts and fciences, and to affift all the promoters of learning. For this purpofe, he refolved to lead a fingle life; fo that when his father had concluded a match for him with a refpectable lady, he begged to be excufed.

In 1605, he accompanied G. Varius, firft prefident of the fenate at Aix, who was very fond of him, to Pa-

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crossed the water, in company with the king's ambafador, 1606, to England. Here he was very gracioufly received by king James I.; and having feen Oxford, and vifited Camden, Sir Robert Cotton, Sir Henry Saville, and other learned men, he paffed over to Holland; and after vifiting the feveral towns and univerfities, with the literati in each, he went through Antwerp to Bruffels, and thence back to Paris, to fee the ceremony of the Dauphin's baptifm; which being folemnized Aug. 24. he returned home in September 1606, being expected for the ordering of the family affairs.

Prefently after this, he purchafed the barony of Rians; and at the follicitation of his uncle, having approved himfelf before that afsembly, he was received a fenator on the 1ft of July 1607. Jan. 1608 he loft his uncle; and the following year, falling himfelf into a dangerous fever, recovered by eating mufk-melons before fupper, for which he had conceived a longing. He was ordered by his phyfician to eat them before his meals without bread, and to drink a glafs of pure wine upon them. He continued this method all his life afterwards; and grew fo fond of them, that, though he could abftain from any other meat as he lifted, yet towards them he profefed he was unable to mafter himfelf. He frequently experienced, that in the mufk-melon feafon he was never troubled with the gravel. In 1618, having procured a faithful copy of "the Afts of the Monaftery of Maren in Switzerland," he published a fecond edition of that work. As it was written in defence of the royal line of France againft Theodoric Piefpordius, who had attempted to prove the title of the Austrian family to the French crown by right of fucceffion, he was, upon this publication, nominated the fame year, by Louis XIII. abbot of Sancta Maria Aquilfienfis. He ftayed in France till 1623; when, upon a meffage from his father, now grown old and fickly, he left Paris, where he had fpent feven years and fome months. He arrived at Aix in October; and not long after prefented to the court a patent from the king, permitting him to continue in the fuction of his ancient dignity, and to exercife the office of a fecular or lay perfon, notwithstanding that, being an abbot, he had affumed the character of a churchman. To this the court of parliament not affenting, decreed unanimoufly, that, being already admitted into the firft rank, he fhould abide perpetually therein; not returning, as the cuftom of the court was, to the inferior auditory, wherein trials are ufually had of criminal cafes. In 1621, he buried his father, who had been long afflicted with the gout. In 1627, he prevailed with the archbifhop of Aix to eftablifh a poft thence to Lyons, and fo to Paris and all Europe; by which the correffpondence constantly held with the literati every where was much facilitated. In 1629, he began to be much tormented with the ftrangury and hemorrhoides; and in 1631, having completed the marriage of his nephew Claudius with Margaret Alrefia, a noblewoman of the county of Avignon, he beftowed upon him the barony of Rienty, together with a grant of his fenatorial dignity, only referving the fuction to himfelf for three years. But the parliament not waiting his furrendry or it, he refented that affront to honourably, that he procured, in 1631, letters patent from the king to be refored, and

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to exercise the office for five years longer, which happened to be till his death: for being seized, June 1637, with a fever that brought on a stoppage of urine, this put an end to his life on the 24th of that month, in his 57th year.

The character of Peirese may be summed up in a few words. His person was of a middle size, and of a thin habit: his forehead large, and his eyes grey; a little hawk-nosed; his cheeks tempered with red; the hair of his head yellow, as also his beard, which he used to wear long; his whole countenance bearing the marks of uncommon and rare courtesy and affability. In his diet he affected cleanliness, and in all things about him; but nothing superfluous or costly. His clothes were suitable to his dignity; yet he never wore silk. In like manner, the rest of his house was adorned according to his condition, and very well furnished; but he neglected his own chamber. Instead of tapestry, there hung the pictures of his chief friends and of famous men, besides innumerable bundles of commentaries, transcripts, notes, collections from books, epistles, and such like papers. His bed was exceeding plain, and his table continually loaded and covered with papers, books, letters, and other things; as also all the seats round about, and the greatest part of the floor. These were so many evidences of the turn of his mind; in respect to which, the writer of his euloge compares him to the Roman Atticus; and Bayle, considering his universal correspondence and general assistance to all the literati in Europe, dashed it out luckily enough, when he called him "the attorney general of the literary republic." The works which he published are, "*Historia provinciarum Galliarum Narbonensis*;" "*Nobilium ejusdem provinciarum familiarum Origines, et separatim Fabricia*;" "*Commentarii rerum omnium memoria dignarum sua ætate gestarum*;" "*Liber de ludicris naturæ operibus*;" "*Mathematica & astronomica varia*;" "*Observationes mathematicæ*;" "*Epistolæ ad S. P. Urbanum VIII. cardinales Barberinos, &c.*;" "*Auctores antiqui Græci et Latini de ponderibus et mensuris*;" "*Elogia et epitaphia*;" "*Inscriptiones antiquæ et novæ*;" "*Genealogia domus Austriacæ*;" "*Catalogus librorum biblioth. reg.*;" "*Poemata varia*;" "*Nunmi Gallici, Saxonici, Britannici, &c.*;" "*Linguarum orientales, Hebræa, Samaritana, Arabica, Egyptiaca, et Indices librorum harum linguarum*;" "*Observationes in varios auctores*." It is remarkable, that though Peirese bought more books than any man of his time, yet his collection left was not large. The reason was, that, as fast as he purchased, he kept continually making presents of them to such learned men as he knew they would be useful to.

PEKIN, the capital city of the empire of China, in Asia, where the emperor generally resides. It is situated in a very fertile plain, 20 leagues distant from the great wall. This name, which signifies the *northern court*, is given to it, to distinguish it from another considerable city called *Nanking*, or the *southern court*. The emperor formerly resided in the latter; but the Tartars, a restless and warlike people, obliged this prince to remove his court to the northern provinces, that he might more effectually repel the incursions of those barbarians, by opposing to them a numerous militia which he generally keeps around his person. It is an exact square, and divided into two parts; namely, that which contains the emperor's palace, which is in

the new city, or, as it is called, the *Tartar's city*, because it is inhabited by Tartars ever since they conquered this empire; the other, called the *Old City*, is inhabited by the Chinese. The circuit of both these together is 52 Chinese lys, each of which contains 240 geometrical paces; being, without the suburbs, full six leagues in circumference, according to the most accurate measurement made by order of the emperor.

Those who have paid attention to the population of this place, reckon the number of inhabitants at 2,000,000, though there are others that double that number.

Grosier tells us, "that the height and enormous thickness of the walls of the Tartar city excite admiration; twelve horsemen might easily ride abreast upon them; they have spacious towers raised at intervals, a bow-shot distant from one another, and large enough to contain bodies of reserve in case of necessity. The city has nine gates, which are lofty and well arched. Over them are large pavilion-roofed towers divided into nine stories, each having several apertures or port-holes: the lower story forms a large hall for the use of the soldiers and officers who quit guard, and those appointed to relieve them. Before each gate a space is left of more than 360 feet: this is a kind of place of arms, inclosed by a semicircular wall equal in height and thickness to that surrounding the city. The great road, which ends here, is commanded by a pavilion-roofed tower like the first, in such manner, that, as the cannon of the former can batter the houses of the city, those of the latter can sweep the adjacent country. The streets of Pekin are straight, about 120 feet wide, a full league in length, and bordered with shops. It is astonishing to see the immense concourse of people that continually fills them, and the confusion caused by the prodigious number of horses, camels, mules, and carriages, which cross or meet each other. Besides this inconvenience, one is every now and then stopped by crowds, who stand listening to fortune-tellers, jugglers, ballad-singers, and a thousand other mountebanks and buffoons, who read and relate stories calculated to promote mirth and laughter, or distribute medicines, the wonderful effects of which they explain with all the eloquence peculiar to them.

"People of distinction oblige all their dependents to follow them. A mandarin of the first rank is always accompanied in his walks by his whole tribunal; and, to augment his equipage, each of the inferior mandarins in his suit is generally attended by several domestics. The nobility of the court, and princes of the blood, never appear in public without being surrounded by a large body of cavalry; and, as their presence is required at the palace every day, their train alone would be sufficient to create confusion in the city. It is very singular, that in all this prodigious concourse no women are ever seen: hence we may judge how great the population of China must be, since the number of females in this country, as well as everywhere else, is superior to that of the other sex.

"As there is a continual influx of the riches and merchandize of the whole empire into this city, the number of strangers that resort hither is immense. They are carried in chairs, or ride on horseback; the latter is more common: but they are always attended by a guide, acquainted with the streets, and who

Pekin.

Grosier's
Description
of China.

Pekin.

knows the houses of the nobility and principal people of the city. They are also provided with a book, containing an account of the different quarters, squares, remarkable places, and of the residence of those in public offices. In summer there are to be seen small temporary shops, where people are served with water cooled by means of ice; and one finds everywhere eating-houses, with refreshments of tea and fruits. Each kind of provision has a certain day and place appointed for its being exposed to sale.

"The governor of Pekin, who is a Manchew Tartar, is styled Governor of the Nine Gates. His jurisdiction extends not only over the soldiers, but also over the people in every thing that concerns the police. No police can be more active; and it is surprising to see, among an infinite number of Tartars and Chinese mixed together, the greatest tranquillity prevail. It is rare, in a number of years, to hear of houses being robbed, or people assassinated. All the principal streets have guard-rooms, and soldiers patrol night and day, each having a sabre hanging from his girdle, and a whip in his hand, to correct, without distinction, those who excite quarrels or cause disorder. The lanes are guarded in the same manner; and have latticed gates, which do not prevent those from being seen who walk in them: they are always kept shut during the night, and seldom opened even to those who are known; if they are, the person to whom this indulgence is granted must carry a lanthorn, and give a sufficient reason for his going out. In the evening, as soon as the soldiers are warned to their quarters by beat of drum, two centinels go and come from one guard-room to another, making a continual noise with a kind of castanet, to show that they are not asleep. They permit no one to walk abroad in the night-time. They even examine those whom the emperor dispatches on business; and if their reply gives the least cause of suspicion; they have a right to convey them to the guard-room. The soldiers in each of the guard-rooms are obliged to answer every time the centinels on duty call out.

"It is by these wise regulations, observed with the greatest strictness, that peace, silence, and safety reign throughout the whole city. The governor is also obliged to go the round; and the officers stationed on the walls, and in the towers over the gates (in which are kept large kettle-drums that are beat every time the guard is relieved), are continually dispatching subalterns to examine the quarters belonging to the gates where they are posted. The least neglect is punished next morning, and the officer who was on guard is cashiered. This police, which prevents nocturnal assemblies, would appear no doubt extraordinary in Europe, and in all probability would not be much relished by our young men of fortune and ladies of quality. But the Chinese think justly: they consider it to be the duty of the magistrates of a city to prefer good order and public tranquillity to vain pleasures which generally occasion many attempts against the lives and property of the citizens. It is true, the support of this police costs the emperor a great deal; for part of the soldiers we have mentioned are maintained for this purpose only. They are all infantry, and their pay is generally very high. Their employment consists not only in watching for those who may occasion distur-

ance in the day time, or walk abroad during the night; they must also take care that the streets are kept clean and swept every day; that they are watered morning and evening in time of dry weather; and that every nuisance is removed. They have orders also to assist in this labour themselves; and to clear the kennels, that the water may have a free course."

The walls of the emperor's palace, including that and the gardens, are about two miles in length. "Although (says Goulier) the Chinese architecture has no resemblance to that of Europe, the imperial palace of Pekin does not fail to strike beholders by its extent, grandeur, and the regular disposition of its apartments, and by the singular structure of its pavilion-roofs, ornamented at each corner with a carved pendent, the lower extremity of which is turned upwards. These roofs are covered with varnished tiles of so beautiful a yellow colour, that, at a distance, they make as splendid an appearance as if they were gilded. Below the upper roof there is another of equal brilliancy, which hangs sloping from the wall, supported by a great number of beams, daubed over with green varnish, and interspersed with gilt figures. This second roof, with the projection of the first, forms a kind of crown to the whole edifice. The palace is a small distance from the south gate of the Tartar city. The entrance to it is through a spacious court, to which there is a descent by a marble staircase, ornamented with two large copper lions, and a balustrade of white marble. This balustrade runs in the form of a horseshoe, along the banks of a rivelet, that winds across the palace with a serpentine course, the bridges over which are of marble. At the bottom of this first court arises a façade with three doors: that in the middle is for the emperor only; the mandarins and nobles pass through those on each side. These doors conduct to a second court, which is the largest of the palace: it is about 300 feet in length, and 50 in breadth. An immense gallery runs round it, in which are magazines, containing rich effects, which belong to the emperor as his private property; for the public treasure is entrusted to a sovereign tribunal called *Hou-pou*. The first of these magazines is filled with plate and vessels of different metals; the second contains the finest kinds of furs; the third, dresses lined with sable, ermine, miniver, and foxes skins, which the emperor sometimes gives in presents to his officers; the fourth is the depository of jewels, pieces of curious marble, and pearls fished up in Tartary; the fifth, consisting of two stories, is full of warirones and trunks, which contain the silk stuffs used by the emperor and his family; the rest are filled with bows, arrows, and other pieces of armour taken from the enemy or presented by different princes.

"The royal hall, called *Tai-tchien*, or the Hall of the Grand Union, is in this second court. It is built upon a terrace about 18 feet in height, incrustured with white marble, and ornamented with balustrades of excellent workmanship. Before this hall all the mandarins range themselves, when they go, on certain days, to renew their homage, and perform those ceremonies that are appointed by the laws of the empire. This hall is almost square, and about 130 feet in length. The ceiling is carved, varnished green, and loaded with gilt dragons. The pillars which support the

roof within are six feet in circumference towards the base, and are coated with a kind of mastic varnished red; the floor is partly covered with coarse carpets, after the Turkish manner; but the walls have no kind of ornament, neither tapestry, lustres, nor paintings.

"The throne, which is in the middle of the hall, consists of a pretty high alcove, exceedingly neat. It has no inscription but the character *ching*, which the authors of this relation have interpreted by the word *holiness*: but it has not always this signification; for it answers better sometimes to the Latin word *eximius*, or the English words *excellent*, *perfect*, *most auspicious*. Upon the platform opposite to this hall stand large vessels of bronze, in which incense is burnt when any ceremony is performing. There are also chandeliers shaped like birds and painted different colours, as well as the wax-candles that are lighted up in them. This platform is extended towards the north, and has on it two lesser halls; one of them is a rotunda that glitters with varnish, and is lighted by a number of windows. It is here that the emperor changes his dress before or after any ceremony. The other is a saloon, the door of which opens to the north: through this door the emperor must pass, when he goes from his apartment to receive on his throne the homage of the nobility; he is then carried in a chair, by officers dressed in long red robes bordered with silk, and caps ornamented with plumes of feathers. It would be difficult to give an exact description of the interior apartments which properly form the place of the emperor, and are set apart for the use of his family. Few are permitted to enter them but women and eunuchs."

The temples and the towers of this city are so numerous, that it is difficult to count them. Provisions of all kinds are exceeding plentiful, they being, as well as the merchandises, brought from other parts by means of canals cut from the rivers, and always crowded with vessels of different sizes, as well as from the adjacent country. An earthquake which happened here in 1731 buried above 100,000 persons in the ruins of the houses which were thrown down. E. Long. 116. 41. N. Lat. 39. 54.

We have already, under the article OBSERVATORY, mentioned the famous observatory in this city, of which we shall give this further account from the Universal History. "The Chinese had thought nothing in the universe could equal in magnificence this famous place; and one of the most celebrated mathematicians of the royal academy of Paris hath made no scruple to represent it as one of the greatest prodigies of art and industry, of beauty and magnificence; and yet, when this celebrated structure came to be viewed by more proper and unbiased judges, it appears to have been of little worth as to its ancient machines, and less as to its situation; and that all that is now valuable in it is owing to the improvements made by Father Verbiest

a Flemish Jesuit, who caused a new set of instruments to be made, with extraordinary care, neatness, and precision.

"This fabric stands in a court of a moderate extent, and is built in the form of a square tower, contiguous to the city wall on the inside, and raised but ten or twelve feet above its bulwark. The ascent up to the top is by a very narrow staircase; and on the platform above were placed all the old instruments, which, though but few, took up the whole room, till Father Verbiest introduced his new apparatus, which he disposed in a more convenient order. These are large, well cast, and embellished; and were the neatness of the divisions answerable to the work, and the telescopes fastened to them according to the new method, they would be equal to those of Europe; but the Chinese artificers were, it seems, either too negligent, or incapable of following his directions. As to the old instruments, they were, by order of the emperor Kang-hi, set aside as useless, and laid in the hall near the tower, where they may be seen through a cross barred window, all covered with rust, and buried in oblivion.

"In this famed observatory there are five mathematicians employed night and day, each in a proper apartment on the top of the tower, to observe all that passes over their heads: one of them is gazing towards the zenith, and the others towards the four points of the compass, that nothing may escape their notice. Their observations extend not only to the motions of the heavenly bodies, but to fires, meteors, winds, rain, thunder, hail, storms, and other phenomena of the atmosphere; and these are carefully entered in their journals, and an account of them is brought every morning to the surveyor of the mathematics, and registered in his office."

PELAGIANS, a Christian sect who appeared about the fifth or end of the fourth century. They maintained the following doctrines. 1. That Adam was by nature mortal, and, whether he had sinned or not, would certainly have died. 2. That the consequences of Adam's sin were confined to his own person. 3. That new-born infants are in the same situation with Adam before the fall. 4. That the law qualified men for the kingdom of heaven, and was founded upon equal promises with the gospel. 5. That the general resurrection of the dead does not follow in virtue of our Saviour's resurrection. 6. That the grace of God is given according to our merits. 6. That this grace is not granted for the performance of every moral act; the liberty of the will, and information in points of duty, being sufficient, &c. The founder of this sect was

PELAGIUS, a native of Great Britain; but whether of England, Scotland, or Wales, is as uncertain as it is immaterial (A). He was born towards the close of the fourth century, and educated in the monastery of

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(A) Dr Henry thinks he was born in North Wales; that his real name was Morgan, of which Pelagius is a translation; and that he was born on the 14th of November A. D. 354, the same day with his great antagonist St. Augustine. The same learned historian gives us the following account of Pelagius and his great coadjutor Celestius. "He received a learned education in his own country, most probably in the great monastery of Bangor near Chester, to the government of which he was advanced A. D. 424. He was long esteemed and loved by St. Jerome and St. Augustine, who kept up a friendly correspondence with him by letters before

Pelagius of Banchor, in Wales, of which he became a monk, and afterwards abbot. In the early part of his life he went over to France, and thence to Rome, where he had the influence to promulgate certain opinions somewhat different from those of the infallible church. His morals being irreproachable, he gained many disciples; and the heresy made so rapid a progress, that, for the salvation of souls, it became necessary for the Pope to exert his power. Pelagius, to avoid the danger, in the year 409 passed over to Sicily, attended by his friend and pupil Celestius. In 411 they landed in Africa, continued some time at Hippo, and were present at the famous conference between the Catholics and Donatists which was held at Carthage in 412. From thence they travelled to Egypt; and from Egypt, in 415, to Palestine, where they were graciously received by John bishop of Jerusalem. In the same year Pelagius was cited to appear before a council of seventeen bishops, held at Diospolis. They were satisfied with his creed, and absolved him of heresy. The African bishops, however, being displeased with their proceedings, appealed to the Roman pontiff: he first approved, and afterwards condemned, the opinions of Pelagius, who, with his pupil Celestius, was publicly excommunicated; and all the bishops who refused to subscribe the condemnation of the Pelagian heresy were immediately deprived. What became of him after this period is entirely unknown; but it seems very probable that he retired to Banchor, and died abbot of that monastery. He wrote, 1. *Expositionem in epist. Paulinas*, lib. xiv. 2. *Epistola ad Demetriadem de virginitate*.

3. *Explanationis symboli ad Damasum*. 4. *Epistola ad Pelagium*. 5. *De libero arbitrio*. These and many other fragments are scattered among the works of St Jerome. They are also collected by Gennadius, and published in Append. op. Mercatoris, p. 373. *Clave*.

PELAGOSA, an island in the Adriatic, which, together with several rocks that appear above water near it, are the remains of an ancient volcano. "I will not assure you (says Fortis) that it was thrown up out of the sea like several other islands in the Archipelago, though there is some ground to suspect this to have been the case; because we find no precise mention of it in the most ancient geographers. It should seem that it ought not to be confused with the Domicele, from which it is 30 miles distant; yet it is not impossible that they have reckoned it among them. The lava which forms the substance of this island, is perfectly like the ordinary lava of Vesuvius, as far as I could discover in passing near it. If a naturalist should land there, and visit on purpose the highest parts of the island, perhaps we might then know whether it has been thrown up by a submarine volcano, as the island near Santerini was in our age; or if we ought to believe it the top of some ancient volcanic mountain, of which the roots and sides have been covered by the waters, which divided Africa from Spain, forming the straits of Gibraltar; an invasion that no one can doubt of who has examined the bottoms and shores of our sea. The Lissian fishermen say, that Pelagosa is subject to frequent and violent earthquakes; and the aspect of the island proves, at

before they discovered the heretical pravity of his opinions; for Pelagius, being a cautious and artful man, for some time vented his peculiar notions as the sentiments of others, without discovering that they were his own. At length, however, he threw off the mask, and openly published and defended his doctrines at Rome about the beginning of the fifth century. This involved him in many troubles, and drew upon him the indignation of his former friends St Jerome and St Augustine, who wrote against him with great acrimony. He is acknowledged, even by his adversaries, to have been a man of good sense and great learning, and an acute disputant, though they load him with the most bitter reproaches for his abuse of these talents. His personal blemishes are painted in very strong colours; and he is represented by these good fathers, in the heat of their zeal, as a very ugly fellow, 'broad-shouldered, thick-necked, fat-headed, lame of a leg, and blind of an eye.' Even the most northern parts of this island (Britain) produced some men of learning in this period. Celestius, the disciple and friend of Pelagius, was a Scotsman, who made a prodigious noise in the world by his writings and disputations about the beginning of the fifth century. He defended and propagated the peculiar opinions of his master Pelagius with so much learning, zeal, and success, that those who embraced these opinions were frequently called Celestians. Before he became acquainted with these doctrines he wrote several books, which were universally admired for their orthodoxy, learning, and virtuous tendency. After he had spent his youth in his own country in a studious privacy, he travelled for his further improvement to Rome, where he became acquainted with Rufinus and Pelagius, and was by them infected with their heresies. From that time he became the most indefatigable and undaunted champion of these heresies, and thereby brought upon himself the indignation of the orthodox fathers of these days, who gave him many very bad names in their writings. St Jerome, whose commentaries on the Ephesians he had presumed to criticise, calls him 'an ignorant, stupid fool, having his belly swelled and distended with Scots pottage; a great, corpulent, barking dog, who was fitter to kick with heels than to bite with his teeth; a Cerberus, who, with his master Pluto (Pelagius), deserved to be knocked on the head, that they might be put to eternal silence.' Such were the flowers of rhetoric which these good fathers employed against the enemies of the orthodox faith! But candour obliges us to observe, that this was perhaps more the vice of the age in which they lived than of the men. Both Pelagius and Celestius were very great travellers; having visited many different countries of Asia and Africa, as well as Europe, with a view to elude the persecutions of their enemies, and to propagate their opinions. It is no inconsiderable evidence of their superior learning and abilities, that their opinions gained great ground in all the provinces both of the eastern and western empire, in spite of the writings of many learned fathers, and the decrees of many councils against them. 'The Pelagian and Celestian heresy (says Photius) not only flourished in great vigour in the West, but was also propagated into the East.'

at first sight, that it has suffered many revolutions; for it is rugged, ruinous, and subverted."

PELALIAH, a Levite (Nehem. viii. 7. x. 10.) He was one of the principal Levites that returned from captivity, and was one of those that signed the covenant that Nehemiah renewed with the Lord.

PELALIAH, son of Amazi and father of Jeroham, of the family of Pashur son of Malchiah, of all whom mention has been made: he was of the race of the priests (Nehem. xi. 12.)

PELASGI. See PELASGIOTIS.

PELASGIA (Pliny); the ancient name of *Lepros*; so called from the Pelasgi, its first inhabitants (Diodorus Siculus.) Also the ancient name of *Peloponnesus*, from Pelasgius, a native of the country (Nicolaus Damascenus, Ephorus).

PELASGICUM (Pausanias, Pliny); the north wall of Athens; so called from the builders, the Pelasgi. There was an execration pronounced on any that should build houses under this wall; because the Pelasgi, while dwelling there, entered into a conspiracy against the Athenians (Thucydides).

PELASGIOTIS, a third part of Thessaly, (Strabo); so called from a very ancient people, the Pelasgi, called *Pelasgiote* (Ptolemy); who formerly, together with the Æolians, occupied Thessaly, and thence that part was called *Pelasgicum Argos*; besides many other parts of Greece. Their name *Pelasgi*, or *Pelargi*, denoting storks, was given them from their wandering roving life (Strabo). The poets extend the appellation to Greeks in general. *Pelasgus*, the epithet. Some of the inhabitants of Crete were called *Pelasgi* (Homer); who thus also calls the neighbouring people to the Cilicians in Troas. The Pelasgi were originally of Arcadia, (Hesiod); but Æschylus makes Argos, near Mycenæ, their country. The Pelasgiotis was situated between Pieria and Macedonia to the north and west, Thessalotis to the south, and Magnesia to the east, (Strabo, Pliny.)

PELATÆ, were free-born citizens, among the Athenians, who by poverty were reduced to the necessity of serving for wages. During their servitude they had no vote in the management of public affairs, as having no estate to qualify them; but this restriction was removed whenever they had released themselves from their servile situation, which they were allowed to do when able to support themselves. While they continued servants, they had also a right to change their masters. We find them sometimes distinguished by the name of *Theta*.

PELATIAH, son of Hananiah, and father of Ishi, of the tribe of Simeon. He subdued the Amalekites upon the mountain of Seir (1 Chron. iv. 42.) The time of this action is unknown.

PELATIAH, son of Benaiah, a prince of the people, who lived in the time of Zedekiah king of Judah, and opposed the wholesome advice given by Jeremiah, to submit to king Nebuchadnezzar. Ezekiel (xi. 1, 2, 3, 4.) being a captive in Mesopotamia, had a vision, in which he saw five and twenty men at the door of the temple of Jerusalem, among which were Jaazaniah the son of Azur, and Pelatiah the son of Benaiah, who were the most remarkable. Then the Lord said to him, "Son of man, these are the men that have thoughts of iniquity, and who are forming pernicious

designs against this city, saying; Have not the houses been built a long time? Jerusalem is the pot, and we are the flesh. Thus saith the Lord: You have made great havock in this city, and have filled its streets with dead bodies. These men are the flesh, and the city is the pot. But as for you, I will make you come forth from the middle of this city, and I will make you perish by the hand of your enemies." As he was prophesying in this manner, Pelatiah the son of Benaiah died.

PELE (Stephanus). There were two towns of this name in Thessaly; the one subject to Eumypilus, the other to Achilles; both extinct. *Peleus* the gentilicious name (*id.*)

PELEG, son of Eber, was born in the year of the world 1757. The scripture says his father gave him the name of Peleg, signifying division, because in his time the earth began to be divided (Gen. xi. 16. x. 25.); whether it was that Noah had begun to distribute the earth among his descendants, some years before the building of Babel; or that Peleg came into the world the same year that Babel was begun, and at the division of languages; or that Eber by a spirit of prophecy gave his son the name of *Peleg* some years before the tower of Babel was begun, is not absolutely certain. That which here perplexes the interpreters is, first, that Peleg came into the world not above 100 years after the deluge. But it should seem, that the number of men was not then sufficient for such an undertaking as that of Babel. Secondly, Joktan the brother of Peleg had already thirteen sons at the time of this dispersion, which happened after the confusion of Babel (Gen. x. 26, 27, 28, &c.) Peleg being born in the thirty-fourth year of Eber (Gen. xi. 16.), it is impossible his brother Joktan should have such a number of children at the birth of Peleg. It seems therefore that he was not born at the time of the dispersion. To this may be answered, that Moses has there enumerated the names of the thirteen sons of Joktan (in Gen. x. 26.) by way of anticipation, though they were not born till a good while after the confusion at Babel; but as they possessed a very large country, it was convenient to take notice of them, and to name them among the other descendants of Noah, who divided the provinces of the east among themselves. However this may have been, at the age of thirty years Peleg begat Reu; and he died at the age of 23.

PELETHITES. The Pelethites and Cherethites were famous under the reign of King David. They were the most valiant men in the army of that prince, and had the guard of his person. See Ezekiel xxv. 16. Zephaniah ii. 5. 1 Samuel xxx. 14. 2 Samuel xv. 18. xx. 7. *Patrick's Comm. Poole's Annot. and Delany's Hist. of the Life of David.*

PELETHRONII, a name or epithet given to the Lapithæ, either because they inhabited the town of Pelethronium at the foot of mount Pelion in Thessaly, or because one of their number bore the name of *Pelethronius*. It is to them, we are told, that mankind are indebted for the invention of the bit with which they tamed their horses with so much dexterity.

PELETHRONIUM (Nicander and Scholiast); a town of Thessaly, situated in a flowery part of mount Pelios; and hence the appellation *thronus*, signifying

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Pelex. "Pelexus." I mean that the Centaurs were natives of that place; to whom Virgil assigns mount Othrys. Mr. Leake, however, assigns the breeding of horses to the Centaurs. Some make the Lapethæ and Centaurs the same; others a different people; allowed however to be both of Thessaly. Their story is greatly recorded in fable. See LAMPROUS.

PELEUS, in fabulous history, a king of Thessaly, son of Alcus and Endeis, the daughter of Chiron. He married Thetis one of the Nereids, and was the only mortal man who ever married an immortal. He was concerned in the murder of his brother Phocus, and was therefore obliged to leave his father's dominions. He fled to the court of Eurytus the son of Actor, who reigned at Pæthia, or according to the opinion of Ovid, the town of which is questioned, to Cæx king of Trachina. He was punished of his murder by Eurytus, with the usual ceremonies, and the king gave him his daughter Antiope in marriage. After this, as Peleus and Eurytus went to the chase of the Calydonian boar, the father-in-law was accidentally killed by an arrow which his son-in-law had aimed at the beast. This unfortunate accident obliged him to banish himself from the court of Pæthia, and he went to Iolchos, where he was also punished of the murder of Eurytus by Acædus the king of the country. His residence at Iolchos was short: Altydamia the wife of Acæstus fell in love with him; but when she found him insensible to her passionate declaration, she accused him of attempts upon her virtue. The king her husband partly believed the accusations of his wife; but not willing to violate the laws of hospitality, by putting him instantly to death, he ordered his officers to conduct him to mount Pelion, on pretence of hunting, and there to tie him to a tree and to leave him a prey to the wild beasts of the place. The orders of Acæstus were faithfully obeyed; but Jupiter knowing the innocence of his grandson Peleus, ordered Vulcan to set him at liberty. As soon as he had been delivered from danger, Peleus assembled his friends in order to punish the ill treatment which he had received from Acæstus. He took Iolchos by force, drove the king from his possessions, and put to death the wicked Altydamia. On the death of Antigone, Peleus made love to Thetis, of whose superior charms Jupiter himself had been enamoured. His pretensions were rejected; for as he was but a mortal, the goddess fled from him with the utmost abhorrence, and the more effectually to evade his inquiries, she generally assumed the shape of a bird, or a tree, or of a tygres. Peleus's passion was fanned by refusal; he offered a sacrifice to the gods; and Proteus informed him, that to obtain Thetis he must surprise her while she was asleep in her grotto, near the shores of Thessaly. This advice was immediately attended to; and Thetis, unable to escape from the grasp of Peleus, at last consented to marry him. Their nuptials were celebrated with the greatest solemnity, all the gods attending and making them each the most valuable presents. The goddess of Discord was the only one of the deities who was absent; and she punished this seeming neglect by throwing an apple into the midst of the assembly of the gods, with the inscription of *Datur pulchriori*. The celebrated Achilles was the fruit of this marriage, whose educa-

tion was early entrusted to the Centaur Chiron, and afterwards to Phoenix, the son of Amyntor. Achilles, it is well known, went to the Trojan war, at the head of his father's troops; and Peleus gloried in having a son who was superior to all the Greeks in valour and intrepidity. His death, however, was the source of great grief to Peleus; but Thetis, to comfort her husband, promised him immortality, and ordered him to retire into the grottoes of the island of Leuce, where he should see and converse with the manes of his son. Peleus had a daughter called *Polydora*, by Antigone.

PELEW ISLANDS, a cluster of small islands situated between the latitudes of 5° and 7° north, and the longitudes 124° and 126° east. Various conjectures have been formed respecting the time of their first discovery by Europeans. Mr Keate, the editor of the only voyage in which we have any account of their climate, soil, and produce, together with the manners of their inhabitants, thinks they were first noticed by the Spaniards from the Philippines, and by them named *Palos* from the number of trees growing in them resembling the masts of ships. This conjecture has been vehemently opposed by a critic, who affirms that the whole of Mr Keate's introduction is erroneous, and that the islands in question were first discovered by a French Jesuit named *Pere Papin*. The Jesuit, he imagines, was directed to them by one of the inhabitants, who had found his way to the Moluccas, where he was baptized. They are said to have been again noticed by *P. Centova* in 1724, who saw at Aginc, the capital of the Merian islands, some of the inhabitants; and from their account gives a description not very favourable of these harmless islanders. Centova's description is to be found in the 15th volume, and the relation of the discovery by *P. Papin* in the 11th volume, of *Lettres Edifiantes et Curieuses*, published at Paris 1781.

The latest and most authentic account of them, however, is given from the Journals of Captain Wilton of the *Antelope*, a packet belonging to the East India company, which was wrecked upon one of them in August 1783. This ship was fitted out in England by the court of directors in the summer 1782, as was then generally understood, for a secret expedition. Whatever may have been her destination, as she was proceeding from Macao in squally weather, the man who, on the night of the 10th of August, had the look out, suddenly called out *Breakers!* But the sound of the word had scarce reached the ears of the officer on deck, before the ship struck and stuck fast; and in less than an hour bulged and filled with water. Having secured the gunpowder, small arms, bread, and such other provisions as were liable to be spoiled by water, Captain Wilton, after many difficulties, effected a landing. The crew of the *Antelope* consisted of 33 Europeans beside the captain, and 16 Chinese; and the only possible means by which they could be delivered from an island, which at first appeared to them uninhabited, was by building a ship capable of transporting them to the nearest European settlement in that quarter of the globe. Whilst they were meditating upon this undertaking, the natives appeared on the second day after their arrival; and their intercourse with them was facilitated by means which ap-

pear as singular as they were providential. Captain Wilson had a servant recommended to him at Macao, who spoke both the Malay and English languages perfectly well; and they had not been long at Pelew before they had the good fortune to meet with a Malay, who had been thrown by a tempest upon this very spot about a year before, and had made himself acquainted with the language of the country; so that by this extraordinary event each party had an interpreter who could readily explain their wants and desires, and by that means prevent a number of misconceptions which might have arisen from making use of signs and gestures only.

The natives are all of a deep copper colour, going perfectly naked. They are of a middling stature, very straight, muscular, and well formed; but their legs, from a little above their ankles to the middle of their thighs, are tattooed so very thick, as to appear dyed of a far deeper colour than the rest of their skin. Their hair is of a fine black, long, and rolled up behind, in a simple manner, close to the back of their heads, which appeared both neat and becoming; but few of them had beards, it being the general custom to pluck them out by the roots.

They began by stroking the bodies and arms of the English, or rather their waistcoats and coat sleeves, as if they doubted whether the garment and the man were not of the same substance; and as the Malay explained the circumstances to them, our people were greatly surprised at the quickness with which they seemed to comprehend every information he gave them. The next thing they noticed was our people's white hands, and the blue veins of their wrists; the former of which they seemed to consider as artificial, and the other as the English manner of tattooing. After being fatigued in this particular, they expressed a further wish to see their bodies; and, among other things, were greatly surprised at finding hair on their breasts, it being considered by them as a great mark of indecency, as it is their custom to eradicate it from every part of the body in both sexes.

They afterwards walked about, testifying great curiosity at every thing they saw, but at the same time expressing a fear that they might be thought too intruding. As our people were conducting them to the tents, one of the natives picked up a bullet, which had been casually dropped on the ground, and immediately expressed his surprize, that a substance so small to the eye should be so very ponderous to the touch; and on their entering the tent, a large Newfoundland dog, and a spaniel which had been tied up there to prevent their being lost, set up a most violent barking, and the natives a noise but little less loud, which at first it was not easy to account for. They ran in and out of the tent, and seemed to wish that they might be made to bark again. This the Malay soon explained to be the effect of their joy and surprize, as these were the first large animals they had ever seen, there being no quadrupeds of any species on these islands, except a very few grey rats in the woods.

After some time it was agreed on by Captain Wilson and his people, that some of the crew should be sent to the king of the place, in order to solicit his friendship, and intreat his permission to build a vessel that might carry them back to their own country.

This business was allotted to the captain's brother; and during his absence, Raa Kook, the king's brother, and several of the natives, remained with our people. This amiable chief seemed to place an entire confidence in those he was among; he endeavoured to accommodate himself to their manners; would sit at table as they did, instead of squatting on his hams; and inquired particularly into the principles and causes of every thing he observed about him, lending his personal assistance in all that was going forward, and even desiring the cook to let him aid him in blowing the fire.

In order to conciliate their affections, Captain Wilson had presented Anna Kooker, another of the king's brothers, with a pair of trowers; but having conceived a greater passion for a white shirt, one was immediately given to him; which he had no sooner put on, than he began to dance and jump about with so much joy, that every body was diverted by his singular gestures, and the contrast which the linen formed with his skin. This prince was about 40, of a short stature, but so plump and fat that he was nearly as broad as he was long. He possessed an abundant share of good humour, and a wonderful turn for mimicry; and had besides a countenance so lively and expressive, that though our people at this time were strangers to almost all he said, yet his face and gestures made them accurately comprehend whatever he was describing.

After three or four days, Abba Thulle the king arrived with a great retinue. He was received with every mark of respect by the ship's company, who were exercised before him, and fired three volleys in different positions. The surprize of the natives, their hooting, hallooing, jumping, and chattering, produced a noise almost equal to the discharge of the muskets; and when one of the men shot a bird, which was done to display the effect of their arms, the surprize it occasioned was wonderful. Some of the natives ran for it, and carried it to the king, who examined it with great attention, but was unable to comprehend how it could be wounded, not having seen any thing pass out of the gun.

Raa Kook expressed great impatience to show the king whatever had impressed his own mind; and taking his brother by the hand, led him to a grindstone which was fixed behind one of the tents. He immediately put it in motion, as he had frequently done before; at the rapidity of which the king was greatly astonished, particularly when he was informed that it would sharpen iron. Captain Wilson ordered a hatchet to be brought and ground, that they might more readily perceive its operation, when Raa Kook eagerly seized the handle, and began turning it, appearing highly delighted to let his brother see how well he understood it. The whole appeared like something supernatural; but the circumstance which most bewildered their ideas was, how the sparks of fire could come, and how a stone so well wetted could become so soon dry.

The king then visited the different tents, and inquired about every thing he saw: all was novelty, and of course interested his attention. When he got to the tent where the Chinese men were, who had been brought with them from Macao, Raa Kook, who re-

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tentive mind never lost a single trace of any thing he had been informed of, acquainted the king that these were a people quite different from the English, and that he had learnt there were many other nations besides these interperled through the world, some of which fought with rams and other with boarling-pikes, an instrument which he held very cheap in comparison with the former.

When the king heard his brother discoursing about a variety of nations, who all spoke differently, and had before him the example of the Chinese, whose language was not the same with the English, he appeared instantly thoughtful and serious, as if struck by conceptions which had never before crossed his mind. He remained a while pensive and bewildered; and this circumstance impressed on every one at the time an idea that there was every reason to imagine that there had never been a communication between those people and any other nation: and indeed it is evident, that if Pere Papis did really visit them in 1712, they had before 1783 lost the remembrance of every trace of European manners. This indeed is not surprising, as they had no other record than knots similar to the quipes of Peru at the landing of the Spaniards.

Raa Kook would now show his brother the kitchen, which was in the hollow of a rock, a little above the cove. It was at the time when the cook was preparing dinner; and though the implements were exceedingly scanty, an iron pot, a tea kettle, a tin sauce-pan, with a poker, a pair of tongs, and a frying-pan, were here of sufficient consequence to excite admiration; nor were the bellows now forgotten by Raa Kook, who taking them up, as he explained their use to the king, seemed ambitious to let his brother see what an adept he was at blowing. The little bald cook, who was always close shaven, and never wore any thing on his head, was likewise pointed out to the king as an object of merriment and curiosity.

Sometime after this the king requested five of Captain Wilson's men to attend him in a war he was going to make against the inhabitants of a neighbouring island called *Oroolong*, who, as he said, had done him an injury. But before this request was made known, he had long struggled with a delicacy of sentiment which no one would have expected to find in regions so disjoined from the rest of mankind. This was no other than that it might prove a temporary inconvenience to the unfortunate strangers who had sought his protection, and might be considered by them as an ungenerous proceeding. It was, however, no sooner made known, than Captain Wilson instantly complied; and every face, which had before been clouded with doubt and apprehension, became immediately brightened and gay.

In this enterprise little more was done than braving their enemies, stripping some cocoa-nut trees of their fruit, and carrying off a number of yams and other provisions; but in another, which was undertaken against the island of Atingall, they were more successful, and showed signs of the same sanguinary disposition which some demon has infused into the whole human race. Nine prisoners of war who had been taken upon this occasion were cruelly put to death; and notwithstanding the English strongly remonstrated against this proceeding, all the arguments they could use were

of no avail. In justification of their conduct, they alleged the necessity of doing it for their own security, declaring that they had formerly only detained them as menial servants, but that they always found means to get back to their own country, and return with such a force as frequently made great depredations.

Having given this general account of the character and conduct of these hitherto unknown people, we now proceed to lay before our readers what we have learned of their government, customs, manners, and arts, together with a description of the face of their country. In this the editor of Captain Wilson's voyage must be our guide; and if our narrative do not satisfy the man of science, it is to be observed, that the Antelope was not a ship sent out purposely to explore undiscovered regions, nor were there people on board properly qualified to estimate the manners of a new race of men; they had amongst them no philosophers, botanists, or draughtsmen, experienced in such scientific pursuits as might enable them to examine with judgment every object which presented itself. Distress threw them upon these islands; and while they were there, all their thoughts were occupied on the means of liberating themselves from a situation of all others the most afflicting to the mind, that of being cut off for ever from the society of the rest of the world.

It, however, clearly appears, from their uniform testimony, that at Pelew the king was considered as the first person in the government.

"He was looked up to as the father of his people; and though divested of all external decorations of royalty, had every mark of distinction paid to his person. His *rupacks* or chiefs approached him with the greatest respect; and his common subjects, whenever they passed near him, or had occasion to address him, put their hands behind them, and crouched towards the ground. Upon all occurrences of moment, he convened the *rupacks* and officers of state; their councils were always held in the open air, where the king first stated the business upon which he had assembled them, and submitted it to their consideration. Each *rupack* delivered his opinion, but without rising from his seat; and when the matter before them was settled, the king standing up put an end to the council.

"When any message was brought him, whether in council or elsewhere, if it came by one of the common people, it was delivered at some distance in a low voice to one of the inferior *rupacks*, who, bending in an humble manner at the king's side, delivered it in the same manner with his face turned aside. His commands appeared to be absolute, though he acted in no important business without the advice of his chiefs; and every day in the afternoon, whether he was at Pelew or with the English, he went to sit in public for the purpose of hearing any requests, or of adjusting any difference or dispute which might have arisen among his subjects."

But these, according to our editor, seldom happened; for as their real wants were but few, and they saw nothing to create artificial ones, every one was chiefly occupied with his own humble pursuits; and as far as the ship's crew, who remained among them about three months, could decide, they appeared to conduct themselves towards each other with the greatest civility and benevolence; never wrangling or entering into quarrels.

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some contentions, as is customary among those who call themselves a polished and enlightened people. Even when children showed a disposition of this kind, they strongly marked their displeasure, by stifling with rebuke their little animosities.

The character of the king is thus drawn by the editor: "The excellent man who reigned over these sons of nature, showed himself in every part of his conduct firm, noble, generous, and benevolent; there was a dignity in all his deportment, a gentleness in all his manners, and a warmth and sensibility about his heart, that won the love of all who approached him. Nature had bestowed on him a contemplative mind, which he had improved by those reflections that good sense dictated and observation confirmed. The happiness of his people seemed to be always in his thoughts. In order more effectually to stimulate them to useful labour, he had himself learnt all the few arts they possessed, and was looked on in some of them to be the best workman in his dominions. Placed as he was by Providence in its obscurer scenes, he lived beloved by his chiefs, and revered by his people; over whom, whilst he preserved a dignity which distinguished his superior station, he reigned more as the father than the sovereign. The eyes of his subjects beheld their naked prince with as much awe and respect as those are viewed with who govern polished nations, and are decorated with all the dazzling parade and ornaments of royalty; nor was the purple robe or the splendid diadem necessary to point out a character which the masterly hand of nature had rendered so perfect."

Next in power to the king was his brother Raa Kook, who was official general of all his forces. It was his duty to summon the rupacks to attend the king for whatever purpose they were wanted. He was also his presumptive heir; the succession of Pelew not going to the king's children till it had passed through his brothers; so that after the demise of Abba Thulle, the sovereignty would have descended to Raa Kook; on his demise to Aira Kooker; and on the death of this last it would have reverted to Qui Bill, the king's eldest son, when Lee Boo, his second son, of whom we have much to say, would have become the hereditary general.

The office of first minister is described as follows: "The king was always attended by a particular chief or rupack, who did not appear to possess any hereditary office, but only a delegated authority. He was always near the king's person, and the chief who was always first consulted; but whether his office was religious or civil, or both, our people could not learn with any certainty. He was not considered as a warrior, or ever bore arms, and had only one wife, whereas the other rupacks had two. The English were never invited to his house, or introduced into it, although they were conducted to those of almost every other chief."

Of the rupacks it is observed, "That they could only be regarded as chiefs or nobles; they were not all of the same degree, as was plain by a difference in

Pelew
Islands.

the *lone* (A) they wore: they generally attended the king, and were always ready at his command to accompany him on any expedition with a number of canoes properly manned, and armed with darts and spears, who were to remain with him till they had his permission to return home with their dependents. In this part of their government we may trace an outline of the feudal system; but from the few opportunities our people had of investigating points of internal government, it appeared that the titles of *rupacks* were personal badges of rank and distinction; nor did they apprehend they were hereditary honours, unless in the reigning family, who must of necessity be of this class."

As to property, it was understood, "That the people possessed only such as arose from their work and labour, but no absolute one in the soil of which the king appeared to be general proprietor. A man's house, furniture, or canoe, was considered as his private property, as was also the land allotted him, as long as he occupied and cultivated it; but whenever he removed with his family to another place, the ground he held reverted to the king, who gave it to whom he pleased, or to those who solicited to cultivate it."

All that part of the island which they had an opportunity of seeing is said to have been well cultivated. It was covered with trees of various kinds and sizes, many of which must have been very large, as they made canoes of their trunks, some of which were capable of carrying 28 or 30 men. Among the timber trees was noticed the ebony, and a tree which when pierced or wounded yielded a thick white liquor of the consistence of cream. "They had also a species of the manchineel tree, in cutting down of which our people frequently got blistered and swelled; the inhabitants pointed out the cause, saying it was owing to their being sprinkled by the sap. This they reckoned among the unlucky trees, and advised our people against the use of it."

But the most singular tree noticed at Pelew, was one in its size and manner of branching not unlike our cherry-tree, but in its leaves resembling the myrtle. Its peculiarity was, that it had no bark, but only an outward coat of about the thickness of a card, which was darker than the inside, though equally close in texture. Its colour was nearly that of mahogany, and the wood was so extremely hard, that few of the tools which the English had could work it. They also found cabbage-trees, the wild bread-fruit, and another tree whose fruit something resembled an almond. But yams and cocoa nuts, being their principal articles of sustenance, claimed their chief attention.

The island Coorooraa, of which Pelew is the capital, likewise produced plantains, bananas, Seville oranges and lemons, but neither of them in any considerable quantity. None of the islands which the English visited had any kind of grain. As to birds, they had plenty of common cocks and hens, which, though not domesticated, kept running about near their houses and plantations; and what appears extremely singular is, that the natives had never made any use of them,

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(A) This was a mark of rank worn upon the wrist, with which Captain Wilson was invested by the king: but what animal it came from our people could not learn.

all our people told them they were excellent eating. It seems they accounted a great dainty; but none but those of a certain dignity were permitted to eat of them. The English left them two geese, which were the only remains of their live stock.

From the description of the country it appears to be very mountainous; but some of the valleys are represented as extensive and beautiful, affording many delightful prospects. The soil being very rich, produces a great abundance of grass, which, as there are no cattle to eat it, grows very high, and was scorched and burnt up by the sun. Our people saw no river at Pelew; their supplies of fresh water being obtained from small streams and ponds, of which there are a great many.

From this account of the scanty produce of these islands, it is evident that no luxury reigned among their inhabitants, whose principal article of food appears to be fish; they had no salt, nor did they make use of spice or any seasoning in any thing they eat. Their drink was also as simple as their diet; it principally consisted of the milk of the cocoa nut; but upon particular occasions they used a kind of sweet drink and sherbet, which latter had the addition of some juice of orange.

The islands appeared to be populous, though to what extent could not be ascertained. Their houses were raised about three feet from the ground, upon stones which appeared as if hewn from the quarry. The interior part of them was without any division, the whole forming one great room, which rose in a ridge like our barns, the outside being thatched thick and close with bamboos or palm leaves. All their implements, utensils, weapons of war, and canoes, are much of the same kind with those which were found in the South Sea islands.

In their marriages they allow a plurality of wives, though in general not more than two. When a woman is pregnant, the utmost attention is paid to her; but upon other occasions no more respect is shown to one sex than the other. "One of our people endeavouring to make himself agreeable to a lady belonging to one of the rupaeks, by what we should call a marked assiduity, Arra Koeker, with the greatest civility, gave him to understand that it was not right to do so."

They have places particularly appropriated to sepulture; their graves being made nearly the same as they are in our country churchyards. The corpse is attended only by women, who at the place of interment make a great lamentation. The men, however, assemble round the body before it is carried to the grave, on which occasion they preserve a solemn silence; their minds, from principles of fortitude or philosophy, being forced to meet the events of mortality with more tranquillity, divested of the external testimony of human weakness."

On the article of religion our editor observes, "That, among all the race of men whom navigation has brought to our knowledge, few appear to be without a sense of something like religion, however it may be mixed with idolatry or superstition. And yet our people, during their continuance with the natives of Pelew, never saw any particular ceremonies, or observed any thing that had the appearance of public worship.

But though there was not found on any of the islands they visited any place appropriated to religious rites, it would perhaps be going too far to declare that the people of Pelew had absolutely no idea of religion. Independent of external testimony, there may be such a thing as the religion of the heart, by which the mind may in awful silence be taught to contemplate the God of Nature; and though unnoticed by the lights which have pointed to the Christian world an unerring path to happiness and peace, yet they might, by the light of reason only, have discovered the efficacy of virtue, and the temporal advantages arising from moral rectitude.

"Superstition is a word of great latitude, and vaguely defined: though it hath in enlightened ages been called the offspring of ignorance, yet in no time hath it existed without having some connection with religion. Now the people of Pelew had beyond all doubt some portion of it, as appeared by the wish expressed by the king when he saw the ship building, that the English would take out of it some particular wood, which he perceived they had made use of, and which he observed was deemed an ill omen, or unpropitious."

"They had also an idea of an evil spirit, that often counteracted human affairs. A very particular instance of this was seen when Mr Barker, a most valuable member in the English society, fell backwards from the side of the vessel, whilst he was on the stocks: Raa Koek, who happened to be present, observed that it was owing to the unlucky wood our people had suffered to remain in the vessel, that the evil spirit had occasioned this mischief to Mr Barker."

"They likewise appeared to entertain a strong idea of divination, as was evident from the ceremonies they practised before they undertook any enterprise of moment. A few occurrences, which are mentioned in the course of the narrative, would also lead us to believe that they could not be altogether unacquainted with the nature of religious worship; for when they were present at the public prayers of the English, they expressed no surprise at what was doing, but seemed desirous to join in them, and constantly preserved the most profound silence. The general even refused to receive a message from the king which arrived during divine service. And upon another occasion, when Captain Wilson told Lee Boo, that good men would live again above, he replied, with great earnestness, "All same Pelew; bad men stay in earth; good men go into sky; become very beautiful;" holding his hand up, and giving a fluttering motion to his fingers. Some later voyagers, however, have affirmed, that these people, notwithstanding their superstition, have no notion whatever of a Deity; a circumstance to which it is extremely difficult to give full credit.

The most wonderful circumstance in the history of this people, except that last mentioned, are the acuteness of their understanding, their hospitality, and the implicit confidence which they placed in utter strangers. That their manners were pleasing, and their society not dull or tedious, is evident from the conduct of Maria Blamhard, one of the seamen, who, when the vessel was built and ready to take her departure with his Captain and his companions, was left behind at his own particular request. That they had the fullest confidence in Captain Wilson and his crew, is put beyond

yond a doubt by the behaviour of the king and Raa Kook when their guests were to leave them. Raa Kook solicited his brother's permission to accompany the English, but from prudential motives was refused. The sovereign, however, resolved to entrust his second son Lee Boo to Captain Wilson's care, that he might improve his mind, and learn such things as at his return would benefit his country.

The instructions which he gave the young man, and the fortitude which he showed upon this occasion, would have done honour to the most enlightened mind. Upon delivering him to Captain Wilson, he used these expressions: "I would wish you to inform Lee Boo of all things which he ought to know, and make him an Englishman. The subject of parting with my son I have frequently revolved; I am well aware that the distant countries he must go through, differing much from his own, may expose him to dangers, as well as diseases, that are unknown to us here, in consequence of which he may die; I have prepared my thoughts to this: I know that death is to all men inevitable; and whether my son meets this event at Pelew or elsewhere is immaterial. I am satisfied, from what I have observed of the humanity of your character, that if he is sick you will be kind to him; and should that happen, which your utmost care cannot prevent, let it not hinder you, or your brother, or your son, or any of your countrymen, returning here: I shall receive you, or any of your people, in friendship, and rejoice to see you again." How noble! This is the language of a king, a father, and a philosopher, who would have been delighted to see his son with European accomplishments. But, alas! the subsequent history of this amiable youth must force a tear from the eye of every reader whose heart is not callous to the genuine feelings of nature and humanity. As soon as they arrived at Macao, the house into which he first entered, and the different articles of furniture, fixed him in silent admiration; but what struck his imagination most was the upright walls and flat ceilings of the rooms, being utterly unable to comprehend how they could be so formed. When he was introduced to the ladies of the family, his deportment was so easy and polite, that it could be exceeded by nothing but his abundant good nature; and at his departure, his behaviour left on the mind of every one present the impression, that, however great the surprise might be which the scenes of a new world had awakened in him, it could hardly be exceeded by that which his own amiable manners and native polish would excite in others.

They were now conducted to the house of an English gentleman, who introduced them into a large hall, which was lighted up, with a table in the middle, covered for supper, and a sideboard handsomely decorated. Here a new scene burst at once upon Lee Boo's mind; he was all eye, all admiration. The vessels of glass particularly rivetted his attention; but when he surveyed himself in a large pier glass at the upper end of the hall, he was in raptures with the deception. It was in truth, to him, a scene of magic, a fairy tale.

Soon after the people of the vessel came on shore, some of them went to purchase things they were in want of; in doing which they did not forget Lee Boo, who was a favourite with them all. Among the trinkets they

brought him was a string of large glass beads, the first sight of which almost threw him into an ecstacy: he hugged them with a transport which could not have been exceeded by the interested possessor of a string of oriental pearls. His imagination suggested to him that he held in his hand all the wealth the world could afford him. He ran with eagerness to Captain Wilson to show him his riches, and begged he would get him a Chinese vessel to carry them to the king his father, that he might see what the English had done for him; adding, that if the people faithfully executed their charge, he would at their return present them with one or two beads as a reward for their services.

Having no quadrupeds at Pelew, the sheep, goats, and other cattle, which he met with at Macao, were viewed with wonder; but soon after, seeing a man pass the house on horseback, he was so much admiring, that he wanted every one to go and look at the strange sight. After the matter, however, was explained to him, he was easily persuaded to get upon horseback himself; and when he was informed what a noble, docile, and useful animal it was, he besought the captain to send one to his uncle Raa Kook, as he was sure it would be of great service to him.

Omitting a number of other particulars of this kind, which excited his curiosity and showed the excellent disposition of his heart, we shall follow him to England, the country from which he was never to return. Here he had not been long before he was sent to an academy to be instructed in reading and writing, which he was extremely eager to attain, and most assiduous in learning. His temper was mild and compassionate in the highest degree: but it was at all times governed by discretion and judgment. If he saw the young asking relief, he would rebuke them with what little English he had, telling them it was a shame to beg when they were able to work; but the intricacies of old age he could never withstand, saying, "Maid give poor old man, old man no able to work."

He always addressed Mr Wilson by the name of Captain, but never would call Mrs Wilson by any other name than mother, looking on that as a mark of the greatest respect; and such was the gratitude of his heart for the kindness they showed him, that if any of the family were ill, he always appeared unhappy. would creep softly up to the chamber, and sit silent by the bedside for a long time together without moving, peeping gently from time to time between the curtains, to see if they slept or lay still.

He was now proceeding with hasty strides in gaining the English language, writing, and accounts, when he was overtaken by that fatal disease, the small-pox, which the greatest pains had been taken to guard him against; and notwithstanding the utmost care and attention of his physician, he fell a victim to this scourge of the human race.

Upon this trying occasion, his spirit was above complaining, his thoughts being all engrossed by the kindness of his benefactors and friends. He told his attendant, that his father and mother would grieve very much, for they knew he was sick. This he repeated several times, "and begged him to go to Pelew, and tell Abba Thulle that Lee Boo take much drink to make small-pox go away, but he die; that the captain

Phœbe
Pelias
Pelion

and another very kind; all English very good men; nor is it sorry he could not speak to the king the number of the things too English had got." Then he reckoned up the presents which had been given him, desiring that they might be properly distributed among the chiefs, and expressing that particular care might be taken of two or three pelicans, which he believed might be presented to his nation.

We have given this short history of Looe Doo, because it exhibits in a strong light the manners of the natives of the Pelw islands, to which we know nothing similar in the history of man from the savage state to that of civilization. They appear to have had no communication with any other people, and were yet neither treacherous, cruel, nor cowardly. They are a striking instance of the weakness of all the philosophic theories by which mankind are usually traced from their origin through the several stages of savagism, barbarism, and civilization, down to the period of refinement, ending in effeminacy.

Since the publication of Captain Wilson's voyage we have some further accounts of these islands, all confirming what we were first told of the gentleness of the people. Two armed ships were, by order of the court of directors, fitted out at Bombay in 1752, for the purpose of surveying the islands of Pelw, and furnishing the natives with domestic animals, and such other things as might add to the comforts of life. Among the presents to the king were swords and other European implements of war; of which it is at least possible that he and his people might have been equally happy had they remained for ever in total ignorance. The foundation of a fort was likewise laid on one of the islands, and possession of it taken in the name of the English; we trust with no remote view of enslaving the people, or of driving them from their native country. It has been likewise announced in a late publication, that Captain McClue, who commanded the armed ships, was so delighted with the manners of the king and his subjects, that he has resolved to pass the remainder of his days on those islands at the early age of 34; and we hope he will prove a father to the people.

PELIAS (tab. hid.), twin-brother of Neleus, was son of Neptune by Tyro, daughter of Salmonus. His birth was concealed by his mother, who wished her father to be ignorant of her incontinence. He was exposed in the woods, but his life was preserved by shepherds; and he received the name of *Pelias*, from a spot of the colour of *lead* in his face. Some time after Tyro married Creteus, son of Æolus, king of Iolchos, and became mother of three children, of whom Æson was the eldest. Pelias visited his mother, and was received in her family; and after the death of Creteus, he unjustly seized the kingdom, which belonged not to him, but to the children of Tyro by the deceased king. To strengthen himself in his usurpation, Pelias consulted the oracle; and when he was told to beware of one of the descendants of Æolus, who should come to his court with one foot shod and the other bare, he privately removed the son of Æson, after he had openly declared that he was dead. These precautions proved vain. Jason, the son of Æson, who had been educated by Chiron, returned to Iolchos, when come to years of maturity; and having lost one of his

shoes in crossing the river Anaurus or the Evraus, Pelias immediately perceived that this was the person whom he had so much dreaded. His unpopularity prevented him from acting with violence to a stranger, whose uncommon dress and commanding aspect had raised admiration in the people. But his ambition was greatly excited, when he saw Jason arrive at his palace, with his friends and his relations, and boldly demand the kingdom which he had usurped. Pelias, conscious that his complaints were well founded, endeavoured to divert his attention, and told him that he would voluntarily resign the crown to him, if he went to Colchis to avenge the death of Phryxos, the son of Atlamus, whom Æetes had cruelly murdered! He further declared, that the expedition would be attended with the greatest glory, and that nothing but the intricacies of old age had prevented himself from visiting the honour of his country, and the injuries of his family, by punishing the assassin. This so warmly recommended, was with equal warmth accepted by the young hero, and his intended expedition was made known all over Greece. While Jason was absent in the Argonautic expedition, Pelias murdered Æson and all his family; but, according to the more received opinion of Ovid, Æson was still living when the Argonauts returned, and he was restored to the flower of youth by the magic of Medea. This change in the vigour and the constitution of Æson astonished all the inhabitants of Iolchos; and the daughters of Pelias, who have received the patronymic of Peliades, expressed their desire to see their father's infirmities vanish by the same powerful magic. Medea, who wished to avenge the injuries which her husband Jason had received from Pelias, raised the desires of the Peliades, by cutting an old ram to pieces, and boiling the flesh in a cauldron, and then turning it into a fine young lamb. After they had seen this successful experiment, the Peliades cut their father's body to pieces, after they had drawn all the blood from his veins, on the assurance that Medea would replenish them by her wonderful power. The limbs were immediately put into a cauldron of boiling water; but Medea suffered the flesh to be totally consumed, and refused to give the promised assistance, and the bones of Pelias did not even receive a burial. The Peliades were four in number, Alceste, Pifidice, Pelopea, and Hippothoe, to whom Hyginus adds Melusa. Their mother's name was Anaxibia, the daughter of Bias or Philomache, the daughter of Amphion. After this parricide, the Peliades fled to the court of Æmetus, where Acastus, the son-in-law of Pelias, pursued them, and took their protector prisoner. The Peliades died, and were buried in Arcadia.

PELICAN, in ornithology. See PELICANUS.

PELICAN, in chemistry, is a glass alembic consisting of one piece. It has a tubulated capital, from which two opposite and crooked beaks pass out, and enter again at the belly of the cucurbit. This vessel has been contrived for a continued distillation and cohabitation, which chemists call *circulation*. The volatile parts of substances put into this vessel rise into the capital, and are obliged to return through the crooked beaks into the cucurbit; and this without interruption, or luting and unluting the vessels.

Although the pelican seems to be a very convenient instrument

Pelias
Pelica

Pelicanus instrument, it is nevertheless little used, and even much neglected at present; either because the modern chemists had for making long experiments; or because they find that two matresses, the mouth of one of which is inserted into the mouth of the other, produce the same effect.

PELICANUS, in ornithology, a genus belonging to the order of anseres. The bill is straight, without teeth, and crooked at the point; the face is naked, and the feet are palmated. Mr Latham enumerates no less than 20 different species of this genus, besides varieties. The most remarkable seem to be these that follow:

1. The carbo, or corvorant, sometimes exceeds seven pounds in weight: the length three feet four; the extent four feet two; the bill dusky, five inches long, destitute of nostrils; the base of the lower mandible is covered with a naked yellow skin, that extends under the chin, and forms a sort of pouch; a loose skin of the same colour reaches from the upper mandible round the eyes and angles of the mouth; the head and neck are of a sooty blackness, but under the chin of the male the feathers are white; and the head in that sex is adorned with a short, loose, pendant crest; in some the crest and hind-part of the head are streaked with white. The coverts of the wings, the scapulars, and the back, are of a deep green, edged with black, and glossed with blue; the quill feathers and tail dusky; the legs are short, strong, and black; the middle claw serrated on the inside; the irides are of a light ash-colour.

These birds occupy the highest parts of the cliffs that impend over the sea: they make their nests of sticks, sea-tang, grass, &c. and lay six or seven white eggs of an oblong form. In winter they disperse along the shores, and visit the fresh waters, where they make great havoc among the fish. They are remarkably voracious, having a most sudden digestion, promoted by the infinite quantity of small worms that fill their intestines. The corvorant has the rankest and most disagreeable smell of any bird, even when alive. Its form is disagreeable; its voice hoarse and croaking, and its qualities base. These birds, however, have been trained to fish like falcons to fowl. Whitelock tells us, that he had a cast of them mannelike hawks, and which would come to hand. He took much pleasure in them; and relate, that the best he had was one presented him by Mr Wood, master of the corvorants to Charles I. It is well known that the Chinese make great use of these birds, or a congenious sort, in fishing; and that not for amusement, but profit.

2. The graculus, or shag, called in the north of England the *crane*, is much inferior in size to the corvorant: the length is 27 inches; the breadth three feet six; the weight three pounds three quarters. The bill is four inches long, and more slender than that of the preceding: the head is adorned with a crest two inches long, pointing backward; the whole plumage of the upper part of this bird is of a fine and very shining green; the edge of the feathers a purplish black; but the lower part of the back, the head, and neck, wholly green; the belly is dusky; the tail of a dusky

hue, tinged with green; the legs are black, and like those of the corvorant.

Both these kinds agree in their manners, and breed in the same places; and, what is very strange in web-footed birds, will perch and build in trees: both swim with their head quite erect, and are very difficult to be shot; for, like the grebes and divers, as soon as they see the flash of the gun, they pop under water, and never rise but at a considerable distance.

3. The bassanus, gannet, or solan goose, weighs seven pounds; the length is three feet one inch; the breadth six feet two inches. The bill is six inches long, straight almost to the point, where it inclines down; and the sides are irregularly jagged, that it may hold its prey with more security: about an inch from the base of the upper mandible is a sharp process pointing forward; it has no nostrils; but in their place a long furrow, that reaches almost to the end of the bill: the whole is of a dirty white, tinged with ash-colour. The tongue is very small, and placed low in the mouth; a naked skin of a fine blue surrounds the eyes, which are of a pale yellow, and are full of vivacity: this bird is remarkable for the quickness of its sight. Martin tells us, that *solian* is derived from an Irish word expressive of that quality.

From the corner of the mouth is a narrow slip of black bare skin, that extends to the hind part of the head; beneath the chin is another, that, like the pouch of the pelican, is dilatible, and of size sufficient to contain five or six entire herrings; which in the breeding season it carries at once to its mate or young.

The young birds, during the first year, differ greatly in colour from the old ones: being of a dusky hue, speckled with numerous triangular white spots; and at that time resemble in colours the speckled diver. Each bird, if left undisturbed, would only lay one egg in the year; but if that be taken away, they will lay another; if that is also taken, then a third; but never more than that season. Their egg is white, and rather less than that of the common goose; the nest is large, and formed of any thing the bird finds floating on the water, such as grass, sea plants, shavings, &c. These birds frequent the Isle of Ailsa, in the Frith of Clyde; the rocks adjacent to St Kilda; the Stalks of S. Mullikerry, near the Orkneys; the Skellig Isles, off the coasts of Kerry, Ireland; and the Bass Isles, in the Frith of Edinburgh: the multitudes that inhabit these places are prodigious. Dr Harvey's elegant account of the latter, will serve to give some idea of the numbers of these, and of the other birds that annually migrate to that little spot.

"There is a small island, called by the Scotch *Bass Island*, not more than a mile in circumference; the surface is almost wholly covered during the months of May and June with nests, eggs, and young birds; so that it is scarcely possible to walk without treading on them: and the flocks of birds in flight are so prodigious as to darken the air like clouds; and their noise is such, that you cannot without difficulty hear your next neighbour's voice. If you look down upon the sea from the top of the precipice, you will see it on every side covered with infinite numbers of birds of different kinds, swimming and hunting for their prey:

Puffins. if in sailing round the island you survey the hanging cliffs, you may see in every crag or fissure of the broken rocks innumerable flocks of various sorts and sizes, more than the stars of heaven when viewed in a serene night: if from afar you see the distant flocks, either flying to or from the island, you would imagine them to be a vast swarm of bees."

Nor do the rocks of St Kilda seem to be less frequented by these birds: for Martin assures us, that the inhabitants of that small island consume annually no less than 22,600 young birds of this species, besides an amazing quantity of their eggs, these being their principal support throughout the year: they preserve both eggs and fowls in pyramidal stone buildings, covering them with turf ashes to preserve them from moisture. This is a dear bought food, earned at the hazard of their lives, either by climbing the most difficult and narrow paths, where (to appearance) they can barely cling, and that too at an amazing height over the raging sea; or else, being lowered down from above, they collect their annual provision, thus hanging in midway air; placing their whole dependence on the uncertain footing of one person, who holds the rope by which they are suspended at the top of the precipice. The young birds are a favourite dish with the North Britons in general: during the season, they are constantly brought from the Balaile to Edinburgh, sold at 20d. a piece, are roasted, and served up a little before dinner as a treat.

Mr Macaulay, missionary from the general assembly to St Kilda, gives the following account of them in that island: "These rocks are in summer totally covered with solan geese and other fowls, and appear at a distance like so many mountains covered with snow. The nests of the solan geese, not to mention those of other fowls, are so close, that when one walks between

them, the hatching fowls on either side can always take hold of one's cloth; and they will often sit until they are attacked, rather than expose their eggs to the danger of being destroyed by the sea pull; at the same time, an equal number fly about, and furnish food for their mates that are employed in hatching; and there are, besides, large flocks of barren fowls of the different tribes that frequent the rocks of St Kilda.

"The solan geese equid almost the same ones in size. The common amusement of the herring-fishers show the great strength of this fowl. The fishers fix a herring upon a board which has a small weight under it, to sink it a little below the surface of the sea: the solan goose, observing the fish, darts down upon it perpendicularly, and with so much force, that he turns his bill irrecoverably through the board, and is taken up directly by the fishers.

"The solan geese repair to St Kilda in the month of March, and continue there till after the beginning of November. Before the middle of that month they, and all the other sea fowls that are fond of this coast, retire much about the same time into some other favourite regions; so that not a single fowl belonging to their element is to be seen about St Kilda from the beginning of winter down to the middle of February. Before the young solan geese fly off, they are larger than their mothers, and the fat on their breasts is sometimes three inches deep. Into what quarter of the world these tribes of wild fowl repair, after winter sets in, whether into the northern ocean, the native country and winter quarters of herrings in general, or into some other region near the sun, or whatever they be of the sleeping kind, they who pry into the mysteries of natural history, or have conversed much with writers of voyages, can best explain (A). I shall only pretend to say, that these different nations of the feathered kind

(A) The continuance of these birds is longer or shorter in the islands according as the inhabitants take or leave their first egg; but, in general, the time of breeding, and that of their departure, seems to coincide with the arrival of the herring, and the migration of that fish (which is their principal food) out of those seas. It is probable therefore that these birds attend the herring and pilchard during their whole circuit round the British islands; the appearance of the former being always esteemed by the fishermen as a sure preface of the approach of the latter. It migrates, we are told, in quest of food as far south as the mouth of the Tagus, being frequently seen off Lisbon during the month of September, or, as some say, December. Of the extensive migrations of this species we have the following more particular account in Pennant's Arctic Zoology: "It inhabits the coast of Newfoundland, where it breeds, and migrates southward as far as South Carolina. In Europe, it is common on the coast of Norway and Iceland; but as it never voluntarily flies over land, is not seen in the British Isles. It winters for food as far as the coast of Lisbon and Gibraltar, where it has been seen in December, plunging for its dinner. Straggle as high as Greenland. In northern Asia, it has been once seen by Steller off Kamtschatka; but has been frequently met with in the southern hemisphere, in the Pacific Ocean; particularly in numbers about New Zealand and New Holland. Captain Cook also saw them in his passage from England to the Cape of Good Hope, and remoter from land than they had been seen elsewhere. Among those of several in the South Sea, is the variety called *fulu*, with a few black feathers in the tail and among the secondaries. They are found not only on the Feroe islands, but on our coasts, one having been brought to me a few years ago which had fallen down wearied with its flight." In the month of August, the same accurate naturalist has observed in Caithness their northern migrations: he has seen them passing the whole day in flocks, from five to fifteen in each: in calm weather they fly high; in storms they fly low, and near the shore; but never cross over the land, even when a bay with promontories intervenes, but follow, at an equal distance, the course of the bay, and regularly double every cape. Many of the parties made a sort of hawk for the sake of fishing: they soared to a vast height, then darting headlong into the sea, made the water foam and spring up with the violence of their descent, after which they pursued their route. Our author inquired whether they ever were observed to return southward in the spring, but was answered in the negative; so it appears that they annually encircle the whole island.

kind are taught to choose the properest habitations and feeding places, and to shift their quarters seasonably, by the unerring hand of God.

"From the account given above of the multitudes of sea-fowls that seek their food on this coast, we may justly conclude that there must be inexhaustible stores of fish there. Let us for a moment confine our attention to the consumption made by a single species of fowls. The solen goose is almost insatiably voracious; he flies with great force and velocity, toils all the day with very little intermission, and digests his food in a very short time; he dissuins to eat any thing worse than herring or mackerel, unless it be in a very hungry place, which he takes care to avoid or abandon. We shall take it for granted that there are 100,000 of that kind around the rocks of St Kilda; and this calculation is by far too moderate, as no less than 20,000 of this kind are destroyed every year, including the young ones. We shall suppose, at the same time, that the solen geese sojourn in these seas for about seven months of the year; that each of them destroys five herrings in a day; a far silence infinitely poor for so greedy a creature, unless it were more than half supported at the expence of other fishes. Here we have 100,000,000 of the finest fish in the world devoured annually by a single species of the St Kilda sea-fowls.

"If, in the next place, it be considered, that much the greatest part of the other tribes have much the same appetite for herring, and pursue it from place to place, in the several migrations it makes from one sea to another, the consumption must be prodigiously great. Taking these into the account, and allowing them the same quantity of food, and of the same kind, by reason of their vast superiority in point of numbers, tho' their stomachs are considerably weaker; we see there are no less than 200,000,000 of herrings swallowed up every year by the birds of a very small district of rocks, which occupy so inconsiderable a space in the Deucalionian ocean.

"Should all the articles of this account be sustained, articles which seem no less just than plain, and should our curiosity lead us into a new calculation, allowing between 600 and 700 to every barrel, it is evident that more than 320,000 barrels are annually carried away by such creatures."

These birds are well known on most of the coasts of England, but not by the name of the *Solen goose*. In Cornwall and in Ireland they are called *gannets*; by the Welsh, *gan*. Mr Ray supposed the Cornish gannet to be a species of large gull; a very excusable mistake; for during his six months residence in Cornwall, he never had an opportunity of seeing that bird, except flying; and in the air it has the appearance of a gull. On that supposition he gave out for the title of *canadilla*, a name borrowed from Aristotle, and which admirably expresses the rapid descent of this bird on its prey. Mr Moyle first detected this mistake; and the Rev. Dr Wharton, B. D. C., by presenting us with a fine specimen of this bird, confirms the opinion of Mr Moyle; at the same time giving the following natural history of the bird.

"The gannet comes on the coasts of Cornwall in the latter end of summer, or beginning of autumn; hovering over the shoals or pilchards that come down

to us through St George's Channel from the northern sea. The gannet seldom comes near the land, but is constant to its prey, a sure sign to the fishermen that the pilchards are on the coasts; and when the pilchards retire, generally about the end of November, the gannets are seen no more. The bird now sent was killed at Chandour, near Mountbay, Sept. 30. 1762, after a long struggle with a water-spaniel, assisted by the boatmen; for it was strong and pugnacious. The person who took it observed that it had a transparent membrane under the eye-lid, with which it covered at pleasure the whole eye, without obscuring the sight or shutting the eye-lid; a gracious provision for the security of the eyes of so weighty a creature, whose method of taking its prey is by darting head long on it from a height of 150 feet or more into the water. About four years ago, one of these birds flying over Penzance, (a thing that rarely happens), and seeing some pilchards lie on a fir-plank, in a cellar used for curing fish, darted itself down with such violence, that it struck its bill quite through the board (about an inch and a quarter thick), and broke its neck."

These birds are sometimes taken at sea by a deception of the like kind; the fishermen fastening a pilchard to a board, as in St Kilda they fasten herrings, and which in the same manner decoys the unwary gannet to its own destruction.

In the *Catara* of Juba may be found many characters of this bird: he says, that the bill is toothed; that its eyes are fiery; and that its colour is white; and in the very name is expressed its furious descent on its prey. The rest of his accounts favour of fable. — We are uncertain whether the gannet breeds in any other parts of Europe besides our own islands; except, as Mr Ray suspects, the fula (described in Clavius's *Exotics*, which breeds in Feroe Isles) be the same bird.

4. The fula, or booby, is somewhat less than a goose; the basis of the bill yellow, and of bare feathers; the eyes of a light-grey colour; the lower part of the bill of a light brown. The colours of the body are brown and white; but varied so in different individuals, that they cannot be described by them. Their wings are very long; their legs and feet pale yellow, shaped like those of cervicants. They frequent the Bahama islands, where they breed all months in the year, laying one, two, or three eggs, on the bare rock. While young, they are covered with a white down, and continue so till they are almost ready to fly. They feed on fish like the rest of this genus; but have a very troublesome enemy of the man-of-war bird, which lives on the spoils obtained from other sea-birds, particularly the booby. As soon as this rapacious enemy perceives that the booby has taken a fish, he flies furiously at him, upon which the former darts to avoid the blow; but as he cannot swallow his prey below water, he is soon obliged to come up again with the fish in his bill as before, when he suffers a new assault; nor does his enemy cease to persecute him till he has got the fish, which the other immediately carries off.

5. The great booby, called by Linnaeus *phalacrocorax*, frequents the rivers and sea coasts of Florida, pursuing and devouring fishes like others of the genus. Mr Catelby informs us, that he has seen

Pelicanus. Several times found them disabled, and sometimes dead, on the shore; whence he thinks that they meet with sharks or other voracious fishes, which destroy them. The bird is about the size of a goose; the head and neck remarkably prominent; the back of a brown colour; the belly dusky white; the feet black, and shape like those of a corvorant; the head elegantly spotted with white; the wings extend six feet when spread. Both this species and the last have a joint in the upper mandible of the bill, by which they can raise it considerably from the lower one without opening the mouth.

*Latham's
Illustration of
Birds.*

6. The aquilus, or man-of-war bird, is in the body about the size of a large fowl; in length three feet, and in breadth 14. The bill is slender, five inches long, and much curved at the point; the colour is dusky; from the base a reddish dark coloured skin spreads on each side of the head, taking in the eyes: from the under mandible hangs a large membranaceous bag attached some way down the throat, as in the pelican, and applied to the same uses; the colour of this is a fine deep red, sprinkled on the sides with a few scattered feathers: the whole plumage is brownish-black, except the wing coverts, which have a rufous tinge: the tail is long, and much forked; the outer feathers are 18 inches or more in length; the middle ones from seven to eight: the legs are small, all the toes are webbed together, and the webs are deeply indented; the colour of them is dusky red.

The female differs in wanting the membranaceous pouch under the chin; and in having the belly white: in other things is greatly like the male.

The frigate pelican, or man-of-war bird (B), as it is by some called, is chiefly, if not wholly, met with between the tropics, and ever out at sea, being only seen on the wing. It is usual with other birds, when fatigued with flying, to rest themselves on the surface of the water; but nature, from the exceeding length of wing ordained to this, has made the rising therefrom utterly impossible, at least writers not only so inform us, but every one whom we have talked with avers the same; though perhaps this is no defect of nature, as it scarcely seems to require much rest; at least, from the length of wing, and its apparent easy gliding motion (much like that of the kite), it appears capable of sustaining very long flights; for it is often seen above 100, and not unfrequently above 200, leagues from land. It has indeed been known to settle on the masts of ships; but this is not a frequent circumstance, though it will often approach near, and hover about the top-mast flag. Sometimes it soars so high in the air as to be scarcely visible, yet at other times approaches the surface of the sea, where, hovering at some distance, the moment he spies a fish, it darts down on it with the utmost rapidity, and seldom without success, flying upwards again as quick as it descended. It is also seen to attack* gulls and other

birds which have caught a fish, when it obliges them to disgorge it, and then take care to seize it before it falls into the water. It is an enemy to the flying-fish; for, on their being attacked beneath by the dolphin and other voracious fish, to escape their jaws, these animals leap out of the water in clusters making use of their long fins as wings to buoy them up in the air, which they are enabled to do so long as they remain wet; but the moment they become dry are useless, and drop into their proper element again: during their flight, the frigate darts in among the shoal, and seizes one or two at least. These birds know the exact place where the fish are to rise from the bubbling of the water, which directs them to the spot: in this they are accompanied by gulls and other birds, who act in concert with them.

These birds, which, though not uncommon everywhere within the tropics, yet are less frequent in some places than others, were seen by Cook in 30th deg. In the old route of navigators, they are mentioned frequently as being met with at Ascension Island, Ceylon, East Indies, and China (c). Dampier saw them in great plenty in the island of Aves in the West Indies. Our other navigators talk of them as frequenting various places of the South Sea, about the Marquesas, Easter Isles, and New Caledonia, also at Otaheitee, though at this last place not in such plenty as in many others. They are said to make nests on trees, if there be any within a proper distance; otherwise on the rocks. They lay one or two eggs of a flesh colour, marked with crimson spots. The young birds are covered with greyish white down: the legs are of the same colour, and the bill is white. There is a variety of this species, which is less, measuring only two feet nine inches in length: the extent from wing to wing is five feet and a half. The bill is five inches long, and red; the base of it, and bare space round the eye, are of the same colour; the nostrils are sufficiently apparent, and appear near the base; the shape of the bill is as in the larger one: the head, hind part of the neck, and upper parts of the body and wings, are ferruginous brown; the throat, fore part of the neck, and breast, are white; the tail is greatly forked as in the other; the legs are of a dirty yellow.

"In my collection (says Latham) is a bird very similar to this, if not the same: general colour of the plumage full black; breast and belly mottled with ash-colour; the inner ridge of the wing the same; the bill has the long furrow, as is seen in the greater one; but the nostrils are sufficiently apparent, being about half an inch in length, rather broader at that part near the base. This has a large red pouch at the chin and throat, as in the former species. It is most likely that mine is the male bird, as others, suspected to be of the opposite sex, have little or no traces of the jugular pouch. This supposition seems justified from a pair in the Hunterian museum, in both of which the plumage is wholly black; the one has a large pouch, the other

* See the account of the fish or booby species above.

(B) It is also called *tailleur*, or tailor, by the French, from the motion of its tail representing a pair of shears when opened; and when on the wing, it opens and shuts them frequently, in the manner of using that instrument.—*Ulloa, Voy. ii. p. 304.*

(c) Thought by Osbeck to be one of the sorts of birds used in fishing by the Chinese.

other destitute of it. Some have supposed that the greater and lesser frigates are the same bird, in different periods of age.

7. The onocrotalus, or pelican of Asia, Africa, and America; though Linnaeus thinks that the pelican of America may possibly be a distinct variety. This creature, in Africa, is much larger in the body than a swan, and somewhat of the same shape and colour. Its four toes are all webbed together; and its neck in some measure resembles that of a swan: but that singularity in which it differs from all other birds is in the bill and the great pouch underneath. This enormous bill is 15 inches from the point to the opening of the mouth, which is a good way back behind the eyes. At the base the bill is somewhat greenish, but varies towards the end, being of a reddish blue. It is very thick in the beginning, but tapers off to the end, where it hooks downwards. The under-chap is still more extraordinary; for to the lower edges of it hang a bag, reaching the whole length of the bill to the neck, which is said to be capable of containing 15 quarts of water. This bag the bird has a power of wrinkling up into the hollow of the under-chap; but by opening the bill, and putting one's hand down into the bag, it may be distended at pleasure. The skin of which it is formed will then be seen of a bluish ash colour, with many fibres and veins running over its surface. It is not covered with feathers, but with a short downy substance as smooth and as soft as latten, and is attached all along to the under edges of the chap, is fixed backward to the neck of the bird by proper ligaments, and reaches near half way down. When this bag is empty, it is not seen; but when the bird has fished with success, it is then incredible to what an extent it is often seen dilated. For the first thing the pelican does in fishing is to fill up the bag; and then it returns to digest its burden at leisure. When the bill is opened to its widest extent, a person may run his hand into the bird's mouth, and conceal it in this monstrous pouch, thus adapted for very singular purposes. Yet this is nothing to what Rayfish assures us, who avers that a man has been seen to hide his whole leg, boot and all, in the monstrous jaws of one of these animals. At first appearance this would seem impossible, as the sides of the under-chap, from which the bag depends, are not above an inch asunder when the bird's bill is first opened; but then they are capable of great separation; and it must necessarily be so, as the bird preys upon large fishes, and hides them by dozens in its pouch. Tertre affirms, that it will hide as many fish as will serve 60 hungry men for a meal.

This pelican was once also known in Europe, particularly in Russia; but it seems to have deserted our coasts. This is the bird of which so many fabulous accounts have been propagated; first as its feeding its young with its own blood, and its carrying a provision of water for them in its great reservoir in the desert. But the absurdity of the first account answers itself; and as for the latter, the pelican uses its bag for very different purposes than that of filling it with water.

Clavigero, in his History of Mexico, says that "there are two species, or rather varieties, of this bird in Mexico; the one having a smooth bill, the other a notched one. Although the Europeans are acquainted with this bird, I do not know whether they are

equally well acquainted with the singular circumstance of its assisting the sick or hurt of its own species; a circumstance which the Americans sometimes take advantage of to procure fish without trouble. They take a live pelican, break its wing, and after tying it to a tree, conceal themselves in the neighbourhood; there they watch the coming of the other pelicans with their provisions, and as soon as they see these throw the fish from their pouch, run in, and after leaving a little for the captive bird, they carry off the rest."

This amazing pouch may be considered as analogous to the crop in other birds; with this difference, that as theirs lie at the bottom of the gullet, so this is placed at the top. Thus, as pigeons and other birds macerate their food for their young in their crops, and then supply them; so the pelican supplies its young by a more ready contrivance, and macerates their food in its bill, or stores it for its own particular sustenance.

The ancients were particularly fond of giving this bird admirable qualities and parental affections: struck, perhaps, with its extraordinary figure, they were willing to supply it with as extraordinary appetites; and having found it with a large reservoir, they were pleased with turning it to the most tender and parental uses. But the truth is, the pelican is a very heavy, sluggish, voracious bird, and very ill fitted to take those flights, or to make those cautious provisions for a distant time, which we have been told they do.

The pelican, says Labat, has strong wings, furnished with thick plumage of an ash-colour, as are the rest of the feathers over the whole body. Its eyes are very small, when compared with the size of its head; there is a sadness in its countenance, and its whole air is melancholy. It is as dull and reluctant in its motions as the flamingo is sprightly and active. It is slow of flight; and when it rises to fly, performs it with difficulty and labour. Nothing, as it would seem, but the spur of necessity, could make these birds change their situation, or induce them to ascend into the air: but they must either starve or fly.

They are torpid and inactive to the last degree, so that nothing can exceed their indolence but their gluttony; it is only from the stimulations of hunger that they are excited to labour; for otherwise they would continue always in fixed repose. When they have raised themselves about 30 or 40 feet above the surface of the sea, they turn their head with one eye downwards, and continue to fly in that posture. As soon as they perceive a fish sufficiently near the surface, they dart down upon it with the swiftness of an arrow, seize it with unerring certainty, and store it up in their pouch. They then rise again, though not without great labour, and continue hovering and fishing, with their head on one side as before.

This work they continue with great effort and industry till their bag is full, and then they fly to land to devour and digest at leisure the fruits of their industry. This, however, it would appear, they are not long in performing; for towards night they have another hungry call, and they again instantly go to labour. At night, when their fishing is over, and the toil of the day crowned with success, these lazy birds retire a little way from the shore; and, though with the webbed feet and clumsy figure of a goose, they will be contented to perch nowhere but upon trees among the light and airy

Pelicans;

Pelicans airy tenants of the forest. There they take their repose for the night; and often spend a great part of the day, except such times as they are fishing, sitting in dismal solitude, and, as it would seem, half asleep. Their attitude is with the head resting upon their great bag, and that resting upon their breast. There they remain without motion, or once changing their position, till the calls of hunger break their repose, and till they find it indispensably necessary to fill their magazine for a fresh meal. Thus their life is spent between sleeping and eating; and our author adds, that they are as fat as they are voracious, as they are every moment vomiting excrement in heaps as large as one's fist.

The same indolent habit seems to attend them even in preparing for incubation, and defending their young when hatched. The female makes no preparation for her nest, nor seems to choose any place in preference to lay in; but drops her eggs on the bare ground, to the number of five or six, and there continues to hatch them. Attached to the place, without any desire of defending her eggs or her young, the tamely sits and suffers them to be taken from under her. Now and then she just ventures to peck, or to cry out when a person offers to bear her off.

She feeds her young with fish macerated for some time in her bag; and when they cry, flies off for a new supply. Labat tells us, that he took two of these when very young, and tied them by the leg to a post stuck into the ground, where he had the pleasure of seeing the old one for several days come to feed them, remaining with them the greatest part of the day, and spending the night on the branch of a tree that hung over them. By these means they were all three become so familiar, that they suffered themselves to be handled; and the young ones very kindly accepted whatever fish he offered them. These they always put first into their bag, and then swallowed at their leisure.

It seems, however, that they are but disagreeable and useless domesticks; their pluttony can scarcely be satisfied; their flesh smells very rancid, and tastes a thousand times worse than it smells. The native Americans kill vast numbers; not to eat, for they are not fit even for the banquet of a savage, but to convert their large bags into purses and tobacco-pouches. They bestow no small pains in dressing the skin with salt and ashes, rubbing it well with oil, and then forming it to their purpose. It thus becomes so soft and pliant, that the Spanish women sometimes adorn it with gold and embroidery to make work-bags of.

Yet, with all the seeming hebetude of this bird, it is not entirely incapable of instruction in a domestic state. Father Raymond assures us, that he has seen one so tame and well educated among the native Americans, that it would go off in the morning at the word of command, and return before night to its master, with its great pouch distended with plunder: a part of which the savages would make it disgorge, and a part they would permit it to reserve for itself.

"The pelican," as Faber relates, "is not destitute of other qualifications. One of those which was brought alive to the duke of Bavaria's court, where it lived 40 years, seemed to be possessed of very uncommon sensations. It was much delighted in the com-

pany and conversation of men, and in music both vocal and instrumental; for it would willingly stand," says he, "by those that sung or sounded the trumpet; and stretching out its head, and turning its ear to the music, listened very attentively to its harmony, though its own voice was little pleasanter than the braying of an ass." Gesner tells us, that the emperor Maximilian had a tame pelican which lived for above 80 years, and that always attended his army on their march. It was one of the largest of the kind, and had a daily allowance by the emperor's orders. As another proof of the great age to which the pelican lives, Aldrovandus makes mention of one of these birds that was kept several years at Mechlin, and was verily believed to be 50 years old.—We often see these birds at our shews about town.

Mr Edwards, in his *History of Birds*, describes the pelican of America from one, the body of which was sent him stuffed and dried. From the point of the bill to the angles of the mouth measured 13 inches, and the wing when closed measured 18 inches. The pouch when dry appeared of the confidence and colour of a brown dry ox's bladder, having fibres running its whole length, and blood-vessels crossing them; and proceeding from the sides of the lower part of the bill, which opened into this pouch, its whole length. The greater bone of the wing being broken, was found to be light, hollow, void of marrow, and the sides of it thin as parchment. Sir Hans Sloane writes thus of it (see *Nat. Hist. of Jamaica*, vol. ii. p. 322.): "This seems to be the same with the white pelican, only of a darker colour. They are frequent in all the seas of the hot West Indies. They fish after the same manner as man-of-war birds, and come into the sheltered bays in stormy weather, where they very often perch on trees: they fly over the sea as gulls, and take the fish when they spy them, by falling down upon them, and they then rise again and do the like. They are not reckoned good food. When they are seen at sea, it is a sign of being near land." Wafer, in his voyage and description of the isthmus of America, says, "The pelican is not found on the South Sea side of the isthmus, but they abound on the northern side: They are of a dark grey colour, and under the throat hangs a bag: the old ones are not eaten, but the young are good meat." Mr Edwards, in another place, gives the description of a pelican, which he says is double the bigness of the largest swan. His drawing was made from the pelican shown at London in 1745, which was brought by Capt. Pelly from the Cape of Good Hope, where they are larger than anywhere else. The body, legs, and feet, very much resemble the pelican of America; and it differs little but in the head and neck, which last is very long, like a swan's; the bill is straighter, and the upper part only hooked at the end; the pouch is shaped something different, hanging more down in the middle. Mr Edwards thus describes it. "From the point of the bill to the angle of the mouth is 20 inches of our English measure, which is six inches more than any natural historian has found it; the academy of Paris having measured one which was about 14 inches, Paris measure I suppose; and our countryman, Willoughby, measured one brought from Russia, which he makes 14 inches English. I thought it something incredible in Willoughby's description, that a man should

should put his head into the pouch under the bill, till I saw it performed in this bird by its keeper, and am sure a second man's head might have been put in with it at the same time."

The Academy of Paris think the bird they have described is the pelican of Aristotle, and the Onocrotalus of Pliny. They are also confirmed in the opinion that this is a long-lived bird; for, out of a great number kept at Versailles, none had died for more than 12 years, being the only animals kept in the menagerie of which some have not died in that time. Some authors say they live 60 or 70 years.

Capt. Keeling, in his voyage to Sierra Leona, says the pelicans there are as large as swans, of a white colour, with exceeding long bills; and M. Thevenot, in his travels to the Levant, observes, that the pelicans about some part of the Nile near the Red Sea swim by the bank side like geese, in such great numbers that they cannot be counted. Father Morolla, in his voyage to Congo, says pelicans are often met with in the road to Singa, and are all over black, except on their breast, which is of a flesh colour like the neck of a turkey. He adds further, that father Francis de Pavia informed him, that on his journey to Singa he observed certain large white birds, with long beaks, necks, and feet, which, whenever they heard the least sound of an instrument, began immediately to dance, and leap about the rivers, where they always reside, and whereof they were great lovers: this, he said, he took a great pleasure to contemplate, and continued often upon the banks of the rivers to observe.

It would extend our article beyond all proportion, were we to touch on each individual species of this extensive genus, together with their accidental varieties. But as the genus is unquestionably very curious, we shall here subjoin a list of books, which such of our readers as desire it may have recourse to for further information: *Edward's History of Birds*; *Natural History of Jamaica*; *Mem. de l'Academie Royale des Sciences, depuis 1666 jusqu'à 1699, tom. 3. troisième partie, p. 156.*; *Willoughby*; *Pennant's British and Arctic Zoology*; and *Latham's Synopsis of Birds*; the last of which is the fullest and most scientific of any we have yet seen.

PELION (Diodorus Siculus, &c.), *Pelios, mons* understood, (Mela, Virgil, Horace, Seneca), a mountain of Thessaly near Ossa, and hanging over the Sinus Pelasgicus, or Pegasus; its top covered with pines, the sides with oaks, (Ovid). Said also to abound in wild ash, (Val. Flaccus). From this mountain was cut the spear of Achilles, called *pelias*, which none but himself could wield, (Homer). Dicæarchus, Aristotle's scholar, found this mountain 1250 paces higher than any other of Thessaly, (Pliny). *Pelios*, Cicero; *Peliascus*, (Catullus), the epithet.

PELLA (anc. geog.), a town situated on the confines of Emathia, a district of Macedonia, (Ptolemy); and therefore Herodotus allots it to Bottia, a maritime district on the Sinus Thermaicus. It was the royal residence, situated on an eminence, verging to the south-west, encompassed with unpassable marshes summer and winter: in which, next the town, a citadel like an island rises, placed on a bank or dam, a prodigious work, both supporting the wall and securing it from any hurt by means of the circumfluent water. At a

distance, it seems close to the town, but is separated from it by the Ludias, running by the walls, and joined to it by a bridge, (Livy): distant from the sea 120 stadia, the Ludias being so far navigable, (Strabo). Mela calls the town *Pelle*, though most Greek authors write *Pella*. The birth-place of Philip, who enlarged it; and afterwards of Alexander, (Strabo, Mela). Continued to be the royal residence down to Perseus, (Livy). Called *Pella Colonia*, (Pliny); *Colonia Julia Augusta*, (Coin). It afterwards came to decline, with but few and mean inhabitants, (Lucian). It is now called *τα Παλαίσινα*, the *Little Paluse*, (Holkrenius). *Pellæus*, both the gentilitious name and the epithet, (Lucian, Juvenal, Martial).—Another PELLA, (Polybius, Pliny); a town of the Decapolis, on the other side the Jordan; abounding in water, like its cognominal town in Macedonia; built by the Macedonians, (Strabo); by Seleucus, (Eusebius); anciently called *Butis*, (Stephanus); *Apamea*, (Strabo); situated 35 miles to the north-east of Gerasa, (Ptolemy). Thither the Christians, just before the siege of Jerusalem by Titus, were divinely admonished to fly, (Eusebius). It was the utmost boundary of the Peræa, or Transjordan country, to the north, (Josephus).

PELLETIER (James), a doctor of physic, and an eminent mathematician, was born at Mans in 1517, and died at Paris in 1582. He was an excellent Latin and French poet, a good orator, physician, and grammarian. He wrote *Oeuvres Poétiques, Commentaires Latins sur Euclide, &c.*

PELLETS, in heraldry, those roundles that are black; called also *ogresses* and *gunstones*, and by the French *torceaux de sable*.

PELLICLE, among physicians, denotes a thin film or fragment of a membrane. Among chemists it signifies a thin surface of crystals uniformly spread over a saline liquor evaporated to a certain degree.

PELLISON, or PELLISON FONTANIER, (Paul), one of the finest geniuses of the 17th century, was the son of James Pellison counsellor at Castres. He was born at Beziers in 1624, and educated in the Protestant religion. He studied with success the Latin, Greek, French, Spanish, and Italian tongues, and applied himself to the reading the best authors in these languages; after which he studied the law at Castres with reputation. In 1652 he purchased the post of secretary to the king, and five years after became first deputy to M. Fouquet. He suffered by the disgrace of that minister; and in 1661 was confined in the Bastille, from whence he was not discharged till four years after. During his confinement he applied himself to the study of controversy; and in 1670 abjured the Protestant religion. Louis XIV. bestowed upon him an annual pension of 2000 crowns; and he likewise enjoyed several posts. In 1676 he had the abbey of Giment, and some years after the priory of St Orens at Auch. He died in 1693. His principal works are, 1. The History of the French Academy. 2. Reflections on religious Disputes, &c. in 4 vols 12mo. 3. The History of Louis XIV. 5. Historical Letters and Miscellanies, in 3 vols 12mo.

PELOPIA, a festival observed by the Eleans in honour of Pelops. A ram was sacrificed on the occasion, which both priests and people were prohibited

Pelletier
||
Pelosia.

Pelopon-
nesus
||
Pelusium.

from partaking of, on pain of excommunication from Jupiter's temple: the neck only was allotted to the officer who provided wood for the sacrifice. This officer was called *Ξυαυς*; and white poplar was the only wood made use of at this solemnity.

PELOPONNESUS, (Dionysius), a large peninsula to the south of the rest of Greece; called, as it were, *Pelopsis nesus* or *insula*, though properly not an island, but a peninsula; yet wanting but little to be one, viz. the isthmus of Corinth, ending in a point like the leaf of the platane or plane-tree. Anciently called *Apia* and *Pelaggia*; a peninsula second to no other country for nobleness; situated between two seas, the Egean and Ionian, and resembling a platane-leaf, on account of its angular recesses or bays, (Pliny, Strabo, Mela). Strabo adds from Homer, that one of its ancient names was *Argos*, with the epithet *Αχαιicum*, to distinguish it from Thessaly, called *Pelagium*. Divided into six parts; namely, Argolis, Laconica, Messenia, Elis, Achaia, and Arcadia, (Mela). Now called the *Morea*.

PELOPS, in fabulous history, the son of Tantalus king of Phrygia, went into Elis, where he married Hippodamia the daughter of CEnomaus king of that country; and became so powerful, that all the territory which lies beyond the Isthmus, and composes a considerable part of Greece, was called *Peloponnesus*, that is, the *island of Pelops*, from his name and the word *Νηος*.

PELTA, a small, light, manageable buckler, used by the ancients. It was worn by the Amazons. The pelta is said by some to have resembled an ivy leaf in form; by others it is compared to the leaf of an Indian fig-tree; and by Servius to the moon in her first quarter.

PELTARIA, in botany: A genus of the filiculosa order, belonging to the tetradynamia class of plants; and in the natural method ranking under the 39th order, *Siliquosæ*. The filicula is entire, and nearly orbiculated, compressed-plane, and not opening.

PELUSIUM (anc. geog.), a noble and strong city of Egypt, without the Delta, distant 20 stadia from the sea; situated amidst marshes; and hence its name and its strength. Called the *key* or *inlet of Egypt* (Diodorus, Hirtius); which being taken, the rest of Egypt lay quite open and exposed to an enemy. Called *Sin* (Ezekiel). *Pelusiacus* the epithet (Virgil, Diodorus). From its ruins arose Damietta. E. Long. 32°. N. Lat. 31°.

Mr Savary gives us the following account of this place: "The period of its foundation, as well as that of the other ancient cities of Egypt, is lost in the obscurity of time. It flourished long before Herodotus. As it commanded the entrance of the country on the side of Asia, the Pharaohs rendered it a considerable fortress: one of them raised a rampart of 30 leagues in length from the walls of this town to Heliopolis. But we find from the history of nations that the long wall of China, those which the weakness of the Greek emperors led them to build round Constantinople, and many others, built at an immense expence, were but feeble barriers against a warlike people: these examples have taught us, that a state, to be in security against a foreign yoke, must form warriors within itself, and that men must be opposed to men. This rampart,

which covered Pelusium, did not stop Cambyfes, who attacked it with a formidable army. The feeble character of the son of Amasis, unable to prevent the desertion of 200,000 Egyptians, who went to found a colony beyond the cataracts, had not force sufficient to oppose that torrent which broke in upon his country. Cambyfes, after a bloody battle, wherein he cut his enemies to pieces, entered Pelusium in triumph. That memorable day, which saw the desertion of one part of the Egyptian militia and the ruin of the other, is the true epoch of the subjugation of that rich country. Since that period, it has passed under the yoke of the Persians, the Macedonians, the Romans, the Greeks, the Arabs, and the Turks. A continued slavery of more than 2000 years seems to secure them an eternal bondage.

"Herodotus, who visited Pelusium some years after the conquest of Cambyfes, relates an anecdote which I cannot omit: 'I surveyed (says he) the plain where the two armies had fought. It was covered with human bones collected in heaps. Those of the Persians were on one side, those of the Egyptians on the other, the inhabitants of the country having taken care to separate them after the battle. They made me take notice of a fact which would have appeared very astonishing to me without their explanation of it. The skulls of the Persians, which were slight and fragile, broke on being lightly struck with a stone; those of the Egyptians, thicker and more compact, resisted the blows of flint. This difference of solidity they attributed to the custom the Persians have of covering their heads from their infancy with the tiara, and to the Egyptian custom of leaving the heads of their children bare and shaved, exposed to the heat of the sun. This explanation appeared satisfactory to me.' Mr Savary assures us that the same customs still subsist in Egypt, of which he frequently had ocular demonstration.

"Pelusium (continues he), after passing under the dominion of Persia, was taken by Alexander. The brave Antony, general of cavalry under Gabinus; took it from his successors, and Rome restored it to Ptolemy Auletes. Pompey, whose credit had established this young prince on the throne of Egypt, after the fatal battle of Pharsalia took refuge at Pelusium. He landed at the entrance of the harbour; and on quitting his wife Cornelia and his son, he repeated the two following verses of Sophocles, 'The free man who seeks an asylum at the court of a king will meet with slavery and chains.' He there found death. Scarcely had he landed on the shore, when Theodore the rhetorician, of the isle of Chio, Septimius the courtier, and Achilles the eunuch, who commanded his troops, wishing for a victim to present to his conqueror, stabbed him with their swords. At the sight of the assassins Pompey covered his face with his mantle, and died like a Roman. They cut off his head, and embalmed it, to offer it to Cæsar, and left his body naked on the shore. It was thus that this great man, whose warlike talents had procured the liberty of the seas for the Romans, and added whole kingdoms to their extended empire, was basely slain in setting foot on the territory of a king who owed to him his crown. Philip his freedman, collecting together, under favour of the night, the wreck of a boat, and stripping off his own cloak to cover the sad remains of his master, burnt them

Letters on
Egypt.

Pelvis
Pembroke-
shire.

them according to the custom. An old soldier, who had served under Pompey's colours, came to mingle his tears with those of Philip, and to assist him in performing the last offices to the manes of his general.—Pelusium was often taken and pillaged during the wars of the Romans, the Greeks, and the Arabs. But in spite of so many disasters, she preserved to the time of the Crusades her riches and her commerce. The Christian princes having taken it by storm, sacked it. It never again rose from its ruins; and the inhabitants went to Damietta." See DAMIETTA.

PELVIS, in anatomy. See there, n° 3—43.

PEMBROKE (Mary Countess of). See HERBERT.

PEMBROKE, in Pembrokeshire, in England, is the principal town in the county. It is situated upon a creek of Milford-Haven, and in the most pleasant part of Wales, being about 256 miles distant from London. It is the county-town, and has two handsome bridges over two small rivers which run into a creek, forming the west side of a promontory. It is well inhabited, has several good houses, and but one church. There is also a custom-house in it. There are several merchants in it, who, favoured by its situation, employ near 200 sail on their own account; so that, next to Caermarthen, it is the largest and richest town in South Wales. It has one long straight street, upon a narrow part of a rock; and the two rivers seem to be two arms of Milford-Haven, which ebbs and flows close up to the town. It is governed by a mayor, bailiffs, and burgeses; and was in former times fortified with walls, and a magnificent castle seated on a rock at the west end of the town. In this rock, under the chapel, is a natural cavern called *Wogan*, remarked for having a very fine echo: this is supposed to have been a store-room for the garrison, as there is a staircase leading into it from the castle: it has also a wide mouth towards the river. This structure being burnt a few years after it was erected, it was rebuilt. It is remarkable for being the birth-place of Henry VII. and for the brave defence made by the garrison for Charles I.

PEMBROKESHIRE, a county of Wales, bounded on all sides by the Irish sea, except on the east, where it joins to Caermarthenshire, and on the north-east to Cardiganshire. It lies the nearest to Ireland of any county in Wales; and extends in length from north to south 35 miles, and from east to west 29, and is about 140 in circumference. It is divided into seven hundreds, contains about 420,000 acres, one city, eight market-towns, two forests, 145 parishes, about 2300 houses, and 25,900 inhabitants. It lies in the province of Canterbury, and diocese of St David's. It sends three members to parliament, viz. one for the shire, one for Haverfordwell, and one for the town of Pembroke.

The air of Pembrokeshire, considering its situation, is good; but it is in general better the farther from the sea. As there are but few mountains, the soil is generally fruitful, especially on the sea coasts; nor are its mountains altogether unprofitable, but produce pasture sufficient to maintain great numbers of sheep and goats. Its other commodities are corn, cattle, pit-coal, marl, fish, and fowl. Among these last are falcons, called here *peregrins*. Amongst the birds common here are migratory sea-birds, that breed in the

Isle of Ramsey, and the adjoining rocks called *The Bishop and his Clerks*. About the beginning of April such flocks of birds, of several sorts, resort to these rocks, as appear incredible to those who have not seen them. They come to them in the night-time, and also leave them then; for, in the evening, the rocks may be seen covered with them, and the next morning not one be seen at all. In like manner, not a single bird shall appear in the evening, and the next morning the rocks shall be covered with them. They also generally make a visit about Christmas, staying a week or longer; and then take their leave till breeding-time. Among these birds are the elugug, razor-bill, puffin, and harry-bird. The elugug lays only one egg, which, as well as those of the puffin and razor-bill, is as big as a duck's, but longer, and smaller at one end. She never leaves it till it is hatched, nor then till the young one is able to follow her; and she is all this time fed by the male. This and the razor-bill breed upon the bare rocks, without any kind of nest. The puffin and harry-bird breed in holes, and commonly in the holes of rabbits; but sometimes they dig holes for themselves with their beaks. The harry-birds are never seen on land but when taken. All the four kinds cannot raise themselves to fly away when they are on land, and therefore they creep or waddle to the cliffs, and throwing themselves off, take wing. The elugug is the same bird which they call in Cornwall a *kiddaw*, and in Yorkshire a *scout*. The razor-bill is the *merre* of Cornwall. The puffin is the *ardic duck* of Ctesius, and the harry-bird the *shire-water* of Sir Thomas Brown. The inhabitants of this county make a very pleasant durable fire of culm, which is the dust of coal made up into balls with a third part of mud. The county is well watered by the rivers Clethy, Dougladye, Cledhew, and Teive; which last parts it from Cardiganshire. There is a division of the county styled *Rhos* in the Welch, by which is meant a large green plain. This is inhabited by the descendants of the Flemings, placed there by Henry I. to curb the Welch, who were never able to expel them, though they often attempted it. On the coasts of this county, as well as on those of Glamorganshire and the Severn Sea, is found a kind of alga or laver, the *laduca marina* of Camden, being a marine plant or weed. It is gathered in spring; of which the inhabitants make a sort of food, called in Welch *thavan*, and in English *black-butter*. Having washed it clean, they lay it to sweat between two flat stones, then shred it small, and knead it well, like dough for bread, and then make it up into great balls or rolls, which is by some eat raw, and by others fried with oatmeal and butter. It is accounted excellent against all distempers of the liver and spleen; and some affirm that they have been relieved by it in the sharpest fits of the stone.

PEN, a town of Somersetshire, in England, on the north-east side of Wincauton, where Kenwald a West Saxon king so totally defeated the Britons, that they were never after able to make head against the Saxons; and where, many ages after this, Edmund Ironside gained a memorable victory over the Danes, who had before, i. e. in 1001, defeated the Saxons in that same place.

PEN, a little instrument, usually formed of a quill, serving to write withal.

Pembroke-
shire,
Pen.

Pen.

Pens are also sometimes made of silver, brass, or iron.

Dutch PENS are made of quills that have passed thro' hot ashes, to take off the grosser fat and moisture, and render them more transparent.

Fountain PEN, is a pen made of silver, brass, &c. contrived to contain a considerable quantity of ink, and let it flow out by gentle degrees, so as to supply the writer a long time without being under the necessity of taking fresh ink.

The fountain-pen is composed of several pieces, as in Plate CCCLXXXII. where the middle piece F carries the pen, which is screwed into the inside of a little pipe, which again is soldered to another pipe of the same bigness as the lid G; in which lid is soldered a male screw, for screwing on the cover, as also for stopping a little hole at the place and hindering the ink from passing through it. At the other end of the piece F is a little pipe, on the outside of which the top-cover H may be screwed. In the cover there goes a port-crayon, which is to be screwed into the last-mentioned pipe, in order to stop the end of the pipe, into which the ink is to be poured by a funnel. To use the pen, the cover G must be taken off, and the pen a little shaken, to make the ink run more freely.

There are, it is well known, some instruments used by practical mathematicians, which are called *pens*, and which are distinguished according to the use to which they are principally applied; as for example, the drawing pen, &c. an instrument too common to require a particular description in this place. But it may be proper to take some notice of the geometric pen, as it is not so well known, nor the principles on which it depends so obvious.

The *geometric PEN* is an instrument in which, by a circular motion, a right line, a circle, an ellipse, and other mathematical figures, may be described. It was first invented and explained by John Baptist Suardi, in a work intitled *Nouveaux Instrumens per la Descrizione di diverse Curve Antiche e Moderne*, &c. Several writers had observed the curves arising from the compound motion of two circles, one moving round the other; but Suardi first realized the principle, and first reduced it to practice. It has been lately introduced with success into the steam-engine by Watt and Bolton. The number of curves this instrument can describe is truly amazing; the author enumerates not less than 1273, which (he says) can be described by it in the simple form. We shall give a short description of it from Adam's Geometrical and Graphical Essays.

Plate CCCLXXXII. fig. 10. represents the geometric pen; A, B, C, the stand by which it is supported; the legs A, B, C are contrived to fold one within the other for the convenience of packing. A strong axis D is fitted to the top of the frame; to the lower part of this axis any of the wheels (as *i*) may be adapted; when screwed to it they are immoveable. EG is an arm contrived to turn round upon the main axis D; two sliding boxes are fitted to this arm; to these boxes any of the wheels belonging to the geometric pen may be fixed, and then slid so that the wheels may take into each other and the immoveable wheel *i*: it is evident, that by making the arm EG re-

volve round the axis D, these wheels will be made to revolve also, and that the number of their revolutions will depend on the proportion between the teeth. Fg is an arm carrying the pencil; this arm slides backwards and forwards in the box *cd*, in order that the distance of the pencil from the centre of the wheel *b* may be easily varied; the box *cd* is fitted to the axis of the wheel *b*, and turns round with it, carrying the arm *fg* along with it: it is evident, therefore, that the revolutions will be fewer or greater in proportion to the difference between the numbers of the teeth in the wheels *b* and *i*; this bar and socket are easily removed for changing the wheels. When two wheels only are used, the bar *fg* moves in the same direction with the bar EG; but if another wheel is introduced between them, they move in contrary directions.

"The number of teeth in the wheels, and consequently the relative velocity of the epicycle or arm *fg*, may be varied in infinitum. The numbers we have used are 8, 16, 24, 32, 40, 48, 56, 64, 72, 80, 88, 96

"The construction and application of this instrument is so evident from the figure, that nothing more need be pointed out than the combinations by which various figures may be produced. We shall take two as examples:

"The radius of EG (fig. 11.) must be to that of *fg* as 10 to 5 nearly; their velocities, or the number of teeth in the wheels, to be equal; the motion to be in the same direction.

"If the length of *fg* be varied, the looped figure delineated at fig. 12. will be produced. A circle may be described by equal wheels, and any radius but the bars must move in contrary directions.

"To describe by this circular motion a straight line and an ellipse. For a straight line, equal radii, the velocity as 1 to 2, the motion in a contrary direction; the same data will give a variety of ellipses, only the radii must be unequal; the ellipses may be described in any direction." See fig. 13.

PEN, or *Penstock*. See PENSTOCK.

Sea-PEN See PENNATULA.

PENANCE, a punishment, either voluntary or imposed by authority, for the faults a person has committed. Penance is one of the seven sacraments of the Romish church. Besides fasting, alms, abstinence, and the like, which are the general conditions of penance, there are others of a more particular kind; as the repeating a certain number of ave-marys, paternosters, and credos, wearing a hair-shirt, and giving one's self a certain number of stripes. In Italy and Spain it is usual to see Christians almost naked, loaded with chains and a cross, and lashing themselves at every step.

PENATES, in Roman antiquity, a kind of tutelary deities, either of countries or particular houses; in which last sense they differed in nothing from the lares. See LARES.

The penates were properly the tutelary gods of the Trojans, and were only adopted by the Romans, who gave them the title of *penates*.

PENCIL, an instrument used by painters for laying on their colours. Pencils are of various kinds, and made of various materials; the largest sorts are made of boar's bristles, the thick ends of which are bound to a stick, bigger or less according to the uses they

Pen

Pencil.

they are designed for: these, when large, are called *brushes*. The finer sorts of pencils are made of camels, badgers, and squirrels hair, and of the down of swans; these are tied at the upper end with a piece of strong thread, and inclosed in the barrel of a quill.

All good pencils, in being drawn between the lips, come to a fine point.

PENCIL, is also an instrument used in drawing, writing, &c. made of long pieces of black-lead or red chalk, placed in a groove cut in a slip of cedar; on which other pieces of cedar being glued, the whole is planed round, and one of the ends being cut to a point, it is fit for use.

Black-lead in fine powder, stirred into melted sulphur, unites with it so uniformly, and in such quantity, in virtue perhaps of its abounding with sulphur, that though the compound remains fluid enough to be poured into moulds, it looks nearly like the coarser sorts of black-lead itself. Probably the way which Prince Rupert is said to have had, mentioned in the third volume of Dr Birch's History of the Royal Society, of making black-lead run like a metal in a mould, so as to serve for black-lead again, consisted in mixing with it sulphur or sulphureous bodies.

On this principle the German black-lead pencils are said to be made; and many of those which are hawked about by certain persons among us are prepared in the same manner: their melting or softening, when held to a candle, or applied to a red-hot iron, and yielding a bluish flame, with a strong smell like that of burning brimstone, betrays their composition; for black-lead itself yields no smell or fume, and suffers no apparent alteration in that heat. Pencils made with such additions are of a very bad kind; they are hard, brittle, and do not cast or make a mark freely either on paper or wood, rather cutting or scratching them than leaving a coloured stroke.

The true English pencils (which Vogel in his mineral system, and some other foreign writers, imagine to be prepared also by melting the black-lead with some additional substances, and casting it into a mould) are formed of black-lead alone sawed into slips, which are fitted into a groove made in a piece of wood, and another slip of wood glued over them: the softest wood, as cedar, is made choice of, that the pencil may be the easier cut; and a part at one end, too short to be conveniently used after the rest has been worn and cut away, is left unfilled with the black-lead, that there may be no waste of so valuable a commodity. These pencils are greatly preferable to the others, though seldom so perfect as could be wished, being accompanied with some degree of the same inconveniences, and being very unequal in their quality, on account of different sorts of the mineral being fraudulently joined together in one pencil, the fore-part being commonly pretty good, and the rest of an inferior kind. Some, to avoid these imperfections, take the finer pieces of black lead itself, which they saw into slips, and fix for use in port-crayons: this is doubtless the surest way of obtaining black-lead crayons, whose goodness can be depended on.

PENDANT, an ornament hanging at the ear, frequently composed of diamonds, pearls, and other jewels.

PENDANTS, in heraldry, parts hanging down from the label, to the number of three, four, five, or six at most, resembling the drops in the Doric freeze. When they are more than three, they must be specified in blazoning.

PENDANTS of a Ship, are those streamers, or long colours, which are split and divided into two parts, ending in points, and hung at the head of masts, or at the yard arm ends.

PENDENE-Vow, in Cornwall, in England, on the north coast, by Morvath. There is here an unfathomable cave under the earth, into which the sea flows at high-water. The cliffs between this and St Ives shine as if they had store of copper, of which indeed there is abundance within-land.

PENDENNIS, in Cornwall, at the mouth of Falmouth-haven, is a peninsula of a mile and a half in compass. On this Henry VIII. erected a castle, opposite to that of St Maw's, which he likewise built. It was fortified by Queen Elizabeth, and served then for the governor's house. It is one of the largest castles in Britain, and is built on a high rock. It is stronger by land than St Maw's, being regularly fortified, and having good outworks.

PENDULOUS, a term applied to any thing that bends or hangs downwards.

PENDULUM, a vibrating body suspended from a fixed point. For the history of this invention, see the article CLOCK.

The theory of the pendulum depends on that of the inclined plane. Hence, in order to understand the nature of the pendulum, it will be necessary to premise some of the properties of this plane; referring, however, to *Inclined PLANE*, and Section VI. in the article MECHANICS, for the demonstration.

I. Let AC (fig. 1.) be an inclined plane, AB its perpendicular height, and D any heavy body: then the force which impels the body D to descend along the inclined plane AC, is to the absolute force of gravity as the height of the plane AB is to its length AC; and the motion of the body will be uniformly accelerated.

II. The velocity acquired in any given time by a body descending on an inclined plane AC, is to the velocity acquired in the same time by a body falling freely and perpendicularly as the height of the plane AB to its length AC. The final velocities will be the same; the spaces described will be in the same ratio; and the times of description are as the spaces described.

III. If a body descend along several contiguous planes, AB, BC, CD, (fig. 2.) the final velocity, namely, that at the point D, will be equal to the final velocity in descending through the perpendicular AE, the perpendicular heights being equal. Hence, if these planes be supposed indefinitely short and numerous, they may be conceived to form a curve; and therefore the final velocity acquired by a body in descending through any curve AF, will be equal to the final velocity acquired in descending through the planes AB, BC, CD, or to that in descending through AE, the perpendicular heights being equal.

IV. If from the upper or lower extremity of the vertical diameter of a circle a cord be drawn, the

Plate
ccxxxv.

Pendulum. time of descent along this cord will be equal to the time of descent through the vertical diameter; and therefore the times of descent through all cords in the same circle, drawn from the extremity of the vertical diameter, will be equal.

V. The times of descent of two bodies through two planes equally elevated will be in the subduplicate ratio of the lengths of the planes. If, instead of one plane, each be composed of several contiguous planes similarly placed, the times of descent along these planes will be in the same ratio. Hence, also, the times of describing similar arches of circles similarly placed will be in the subduplicate ratio of the lengths of the arches.

VI. The same things hold good with regard to bodies projected upward, whether they ascend upon inclined planes or along the arches of circles.

The point or axis of suspension of a pendulum is that point about which it performs its vibrations, or from which it is suspended.

The centre of oscillation is a point in which, if all the matter in a pendulum were collected, any force applied at this centre would generate the same angular velocity in a given time as the same force when applied at the centre of gravity.

The length of a pendulum is equal to the distance between the axis of suspension and centre of oscillation.

Plate
ccclxxx.

Let PN (fig. 3.) represent a pendulum suspended from the point P; if the lower part N of the pendulum be raised to A, and let fall, it will by its own gravity descend through the circular arch AN, and will have acquired the same velocity at the point N that a body would acquire in falling perpendicularly from C to N, and will endeavour to go off with that velocity in the tangent ND; but being prevented by the rod or cord, will move through the arch NB to B, where, losing all its velocity, it will by its gravity descend through the arch BN, and, having acquired the same velocity as before, will ascend to A. In this manner it will continue its motion forward and backward along the arch ANB, which is called an *oscillatory* or *vibratory* motion; and each swing is called a *vibration*.

PROP. I. If a pendulum vibrates in very small circular arches, the times of vibration may be considered as equal, whatever be the proportion of the arches.

Let PN (fig. 4.) be a pendulum; the time of describing the arch AB will be equal to the time of describing CD; these arches being supposed very small.

Join AN, CN; then since the times of descent along all cords in the same circles, drawn from one extremity of the vertical diameter, are equal; therefore the cords AN, CN, and consequently their doubles, will be described in the same time; but the arches AN, CN being supposed very small, will therefore be nearly equal to their cords: hence the times of vibrations in these arches will be nearly equal.

PROP. II. Pendulums which are of the same length vibrate in the same time, whatever be the proportion of their weights.

This follows from the property of gravity, which is always proportional to the quantity of matter, or to

its inertia. When the vibrations of pendulums are compared, it is always understood that the pendulums describe either similar finite arcs, or arcs of evanescent magnitude, unless the contrary is mentioned.

PROP. III. If a pendulum vibrates in the small arc of a circle, the time of one vibration is to the time of a body's falling perpendicularly through half the length of the pendulum as the circumference of a circle is to its diameter.

Let PE (fig. 5.) be the pendulum which describes the arch ANC in the time of one vibration; let PN be perpendicular to the horizon, and draw the cords AC, AN; take the arc Ee infinitely small, and draw EFG, efg perpendicular to PN, or parallel to AC; describe the semicircle BGN, and draw er, gs perpendicular to EG: now let t = time of descending through the diameter 2PN, or through the cord AN: Then the velocities gained by falling through 2PN, and by the pendulum's descending through the arch AE, will be as $\sqrt{2PN}$ and \sqrt{BF} ; and the space described in the time t , after the fall through 2PN, is 4PN. But the times are as the spaces divided by the velocities.

Therefore $\frac{4PN}{\sqrt{2PN}}$ or $2\sqrt{2PN} : t :: \frac{Ee}{\sqrt{BF}}$: time of describing Ee = $\frac{t \times Ee}{2\sqrt{2PN} \times BF}$. But in the similar triangles PEF, Eer, and KGF, Ggs ,

$$\text{As } PE=PN : EF :: Ee : er = \frac{EF}{PN} \times Ee;$$

$$\text{And } KG=KD : FG :: Gg : Gs = \frac{FG}{KD} \times Gg.$$

$$\text{But } er = Gs; \text{ therefore } \frac{EF}{PN} \times Ee = \frac{FG}{KD} \times Gg.$$

$$\text{Hence } Ee = \frac{PN \times FG}{KD \times EF} \times Gg.$$

And by substituting this value of Ee in the former equation, we have the time of describing Ee = $\frac{t \times PN \times FG \times Gg}{2KD \times EF \times \sqrt{BF} \times 2PN}$: But by the nature of the circle $FG = \sqrt{BF} \times FN$, and $EF = \sqrt{PN + PF} \times FN$. Hence, by substitution, we obtain the time of describing

$$Ee = \frac{t \times PN \times \sqrt{BF} \times FN \times Gg}{2KD \times \sqrt{PN + PF} \times FN \times \sqrt{BF} \times 2PN} = \frac{t \times \sqrt{PN} \times Gg}{2KD \times \sqrt{PN + PF} \times \sqrt{2}} = \frac{t \times \sqrt{21N}}{2BN \times \sqrt{21N - NF}} \times Gg.$$

But NF, in its mean quantity for all the arches Gg, is nearly equal to NK; therefore the time of describing Ee = $\frac{t \times \sqrt{21N}}{2BN \times \sqrt{21N - NK}} \times Gg$. Whence the time of describing the arch AED

$$= \frac{t \times \sqrt{21N}}{2BN \times \sqrt{21N - NK}} \times BGN; \text{ and the time of describing the whole arch ADC, or the time of one vibration, is } = \frac{t \times \sqrt{2PN}}{2BN \times \sqrt{2PN - NK}} \times 2BGN.$$

But when the arch ANC is very small, NK vanishes, and then

then the time of vibration in a very small arc is

$$= \frac{t \times \sqrt{2PN}}{2BN \times \sqrt{2PN}} \times 2BGN = \frac{1}{4} \times \frac{2BGN}{BN}$$
 Now if t be the time of descent through $2PN$; then since the spaces described are as the squares of the times, $\frac{1}{4}t$ will be the time of descent through $\frac{1}{2}PN$: therefore the diameter BN is to the circumference $2BGN$, as the time of falling through half the length of the pendulum is to the time of one vibration.

PROP. IV. The length of a pendulum vibrating seconds is to twice the space through which a body falls in one second, as the square of the diameter of a circle is to the square of its circumference.

Let d = diameter of a circle = 1, c = circumference = 3.14159, &c. t to the time of one vibration, and p the length of the corrupt pendulum; then by

last proposition $c : d :: 1'' : \frac{d}{c}$ = time of falling through half the length of the pendulum. Let s = space described by a body falling perpendicularly in the first second: then since the spaces described are in the subduplicate ratio of the times of description, therefore
 $1'' : \frac{d}{c} :: \sqrt{s} : \sqrt{\frac{1}{2}p}$. Hence $c^2 : d^2 :: 2s : p$.

It has been found by experiment, that in latitude $51\frac{1}{2}^\circ$ a body falls about 16.11 feet in the first second: hence the length of a pendulum vibrating seconds in that latitude is $= \frac{32.22}{3.14159} = 3$ feet 3.174 inches.

PROP. V. The times of the vibrations of two pendulums in similar arcs of circles are in a subduplicate ratio of the lengths of the pendulums.

Let PN, PO (fig. 6.) be two pendulums vibrating in the similar arcs AB, CD ; the time of a vibration of the pendulum PN is to the time of a vibration of the pendulum PO in a subduplicate ratio of PN to PO .

Since the arcs AN, CO are similar and similarly placed, the time of descent through AN will be to the time of descent through CO in the subduplicate ratio of AN to CO : but the times of descent through the arcs AN and CO are equal to half the times of vibration of the pendulums PN, PO respectively. Hence the time of vibration of the pendulum PN in the arc AB is to the time of vibration of the pendulum PO in the similar arc CD in the subduplicate ratio of AN to CO : and since the radii PN, PO are proportional to the similar arcs AN, CO , therefore the time of vibration of the pendulum PN will be to the time of vibration of the pendulum PO in a subduplicate ratio of PN to PO .

If the length of a pendulum vibrating seconds be 39.174 inches, then the length of a pendulum vibrating half seconds will be 9.793 inches. For $1'' : \frac{1}{2}'' :: \sqrt{39.174} : \sqrt{x}$; and $1 : \frac{1}{2} :: 39.174 : x$. Hence
 $x = \frac{39.174}{4} = 9.793$.

PROP. VI. The lengths of pendulums vibrating in the same time, in different places, will be as the forces of gravity.

For the velocity generated in any given time is di-

rectly as the force of gravity, and inversely as the quantity of matter *. Now the matter being supposed the same in both pendulums, the velocity is as the force of gravity; and the space passed through in a given time will be as the velocity; that is, as the gravity. * See Mechanics, p. 774.

COR. Since the lengths of pendulums vibrating in the same time in small arcs are as the gravitating forces, and as gravity increases with the latitude on a count of the spheroidal figure of the earth and its rotation about its axis; hence the length of a pendulum vibrating in a given time will be variable with the latitude, and the same pendulum will vibrate slower the nearer it is carried to the equator.

PROP. VII. The time of vibrations of pendulums of the same length, acted upon by different forces of gravity, are reciprocally as the square roots of the forces.

For when the matter is given, the velocity is as the force and time; and the space described by any given force is as the force and square of the time. Hence the lengths of pendulums are as the forces and the squares of the times of falling through them. But these times are in a given ratio to the times of vibration; whence the lengths of pendulums are as the forces and the squares of the times of vibration. Therefore, when the lengths are given, the forces will be reciprocally as the square of the times, and the times of vibration reciprocally as the square roots of the forces.

COR. Let p = length of pendulum, g = force of gravity, and t = time of vibration. Then since $p = g \times t^2$. Hence $g = p \times \frac{1}{t^2}$; and $t = \sqrt{p \times \frac{1}{g}}$.

That is, the forces in different places are directly as the lengths of the pendulums, and inversely as the square roots of the times of vibration; and the times of vibration are directly as the square roots of the lengths of the pendulums, and inversely as the square roots of the gravitating forces.

PROP. VIII. A pendulum which vibrates in the arch of a cycloid describes the greatest and least vibrations in the same time.

This property is demonstrated only on a supposition that the whole mass of the pendulum is concentrated in a point: but this cannot take place in any really vibrating body; and when the pendulum is of finite magnitude, there is no point given in position which determines the length of the pendulum; on the contrary the centre of oscillation will not occupy the same place in the given body, when describing different parts of the tract it moves through, but will continually be moved in respect of the pendulum itself during its vibration. This circumstance has prevented any general determination of the time of vibration in a cycloidal arc, except in the imaginary case referred to.

There are many other obstacles which concur in rendering the application of this curve to the vibration of pendulums designed for the measures of time the source of errors far greater than those which by its peculiar property it is intended to obviate; and it is now wholly disused in practice.

Although the times of vibration of a pendulum in

Pendulum. different arches be nearly equal, yet from what has been said, it will appear, that if the ratio of the least of these arches to the greatest be considerable, the vibrations will be performed in different times; and the difference, though small, will become sensible in the course of one or more days. In clocks used for astronomical purposes, it will therefore be necessary to observe the arc of vibration; which if different from that described by the pendulum when the clock keeps time, there a correction must be applied to the time shown by the clock. This correction, expressed in seconds of time, will be equal to the half of three times the difference of the square of the given arc, and of that of the arc described by the pendulum when the clock keeps time, the arcs being expressed in degrees *; and so much will the clock gain or lose according as the first of these arches is less or greater than the second.

* *Simpson's Fluxions*, p. 341.

Thus, if a clock keeps time when the pendulum vibrates in an arch of 3° , it will lose $10\frac{1}{2}$ seconds daily in an arch of 4° degrees.

For $4^2 - 3^2 \times \frac{1}{2} = 7 \times \frac{1}{2} = 10\frac{1}{2}$ seconds.

† See *Pyrometer*.

The length of a pendulum rod increases with heat; and the quantity of expansion answering to any given degree of heat is experimentally found by means of a pyrometer †; but the degree of heat at any given time is shown by a thermometer: hence that instrument should be placed within the clock-case at a height nearly equal to that of the middle of the pendulum; and its height, for this purpose, should be examined at least once a day. Now by a table constructed to exhibit the daily quantity of acceleration or retardation of the clock answering to every probable height of the thermometer, the corresponding correction may be obtained. It is also necessary to observe, that the mean height of the thermometer during the interval ought to be used. In Six's thermometer this height may be easily obtained; but in thermometers of the common construction it will be more difficult to find this mean.

It had been found, by repeated experiments, that a brass rod equal in length to a second pendulum will expand or contract $\frac{1}{1000}$ part of an inch by a change of temperature of one degree in Fahrenheit's thermometer; and since the times of vibration are in a subduplicate ratio of the lengths of the pendulum, hence an expansion or contraction of $\frac{1}{1000}$ part of an inch will answer nearly to one second daily: therefore a change of one degree in the thermometer will occasion a difference in the rate of the clock equal to one second daily. Whence, if the clock be so adjusted as to keep time when the thermometer is at 55° , it will lose 10 seconds daily when the thermometer is at 65° , and gain as much when it is at 45° .

Hence the daily variation of the rate of the clock from summer to winter will be very considerable. It is true indeed that most pendulums have a nut or regulator at the lower end, by which the bob may be raised or lowered a determinate quantity; and therefore, while the height of the thermometer is the same, the rate of the clock will be uniform. But since the state of the weather is ever variable, and as it is impossible to be raising or lowering the bob of the pendulum at every change of the thermometer, therefore the correction formerly mentioned is to be applied. This correction, however, is in some measure liable to a

small degree of uncertainty; and in order to avoid it altogether, several contrivances have been proposed by constructing a pendulum of different materials, and so disposing them that their effects may be in opposite directions, and thereby counterbalance each other; and by this means the pendulum will continue of the same length.

Mercurial PENDULUM. The first of these inventions is that by the celebrated Mr George Graham. In this, the rod of the pendulum is a hollow tube, in which a sufficient quantity of mercury is put. Mr Graham first used a glass tube, and the clock to which it was applied was placed in the most exposed part of the house. It was kept constantly going, without having the hands or pendulum altered, from the 9th of June 1722 to the 14th of October 1725, and its rate was determined by transits of fixed stars. Another clock made with extraordinary care, having a pendulum about 60 pounds weight, and not vibrating above one degree and a half from the perpendicular, was placed beside the former, in order the more readily to compare them with each other, and that they might both be equally exposed. The result of all the observations was this, that the irregularity of the clock with the quicksilver pendulum exceeded not, when greatest, a sixth part of that of the other clock with the common pendulum, but for the greatest part of the year not above an eighth or ninth part; and even this quantity would have been lessened, had the column of mercury been a little shorter: for it differed a little the contrary way from the other clock, going faster with heat and slower with cold. To confirm this experiment more, about the beginning of July 1723 Mr Graham took off the heavy pendulum from the other clock, and made another with mercury, but with this difference, that instead of a glass tube he used a brass one, and varnished the inside to secure it from being injured by the mercury. This pendulum he used afterwards, and found it about the same degree of exactness as the other.

The **Gridiron PENDULUM** is an ingenious contrivance for the same purpose. Instead of one rod, this pendulum is composed of any convenient odd number of rods, as five, seven, or nine; being so connected, that the effect of one set of them counteracts that of the other set; and therefore, if they are properly adjusted to each other, the centres of suspension and oscillation will always be equidistant. Fig. 7. represents a gridiron pendulum composed of nine rods, steel and brass alternately. The two outer rods, AB, CD, which are of steel, are fastened to the cross pieces AC, BD by means of pins. The next two rods, EF, GH, are of brass, and are fastened to the lower bar BD, and to the second upper bar EG. The two following rods are of steel, and are fastened to the cross bars EG and IK. The two rods adjacent to the central rod being of brass, are fastened to the cross pieces IK and LM; and the central rod, to which the ball of the pendulum is attached, is suspended from the cross piece LM, and passes freely through a perforation in each of the cross bars IK, BD. From this disposition of the rods, it is evident that, by the expansion of the extreme rods, the cross piece BD, and the two rods attached to it, will descend: but since these rods are expanded by the same heat, the cross piece EG will consequently

Mercurial Pendulum

Phil. Trans. 1726, p. 394.

Gridiron Pendulum

Plate cccc.

pendulum. ly be raised, and therefore also the two next rods; but because these rods are also expanded, the cross bar IK will descend; and by the expansion of the two next rods, the piece LM will be raised a quantity sufficient to counteract the expansion of the central rod. Whence it is obvious, that the effect of the steel rods is to increase the length of the pendulum in hot weather, and to diminish it in cold weather, and that the brass rods have a contrary effect upon the pendulum. The effect of the brass rods must, however, be equivalent not only to that of the steel rods, but also to the part above the frame and spring, which connects it with the cock, and to that part between the lower part of the frame and the centre of the ball.

2. *Thiout.* Another excellent contrivance for the same purpose is described in a French author on clock-making. It was used in the north of England by an ingenious artist about 40 years ago. This invention is as follows: A bar of the same metal with the rod of the pendulum, and of the same dimensions, is placed against the back part of the clock-case: from the top of this a part projects, to which the upper part of the pendulum is connected by two fine pliable chains or silken strings, which just below pass between two plates of brass, whose lower edges will always terminate the length of the pendulum at the upper end. These plates are supported on a pedestal fixed to the back of the case. The bar rests upon an immoveable base at the lower part of the case; and is inserted into a groove, by which means it is always retained in the same position. From this construction, it is evident that the extension or contraction of this bar, and of the rod of the pendulum, will be equal, and in contrary directions. For suppose the rod of the pendulum to be expanded any given quantity by heat; then, as the lower end of the bar rests upon a fixed point, the bar will be expanded upwards, and raise the upper end of the pendulum just as much as its length was increased; and hence its length below the plates will be the same as before.

Of this pendulum, somewhat improved by Mr Crosthwaite watch and clockmaker, Dublin, we have the following description in the Transactions of the Royal Irish Academy, 1788.—“A and B (fig. 8.) are two rods of steel forged out of the same bar, at the same time, of the same temper, and in every respect similar. On the top of B is formed a gibbet C; this rod is firmly supported by a steel bracket D, fixed on a large piece of marble E, firmly set into the wall F, and having liberty to move freely upwards between cross staples of brass, 1, 2, 3, 4, which touch only in a point in front and rear (the staples having been carefully formed for that purpose); to the other rod is firmly fixed by its centre the lens G; of 24 pounds weight, although it should in strictness be a little below it. This pendulum is suspended by a short steel spring on the gibbet at C; all which is entirely independent of the clock. To the back of the clock-plate I are firmly screwed two checks nearly cycloidal at K, exactly in a line with the centre of the verge L. The maintaining power is applied by a cylindrical steel-stud, in the usual way of regulators, at M. Now, it is very evident, that any expansion or contraction that takes place in either of these exactly similar rods, is instantly counteracted by the other; whereas in all compensation pendulums composed of different materials, however

just calculation may seem to be, that can never be the case, as not only different metals, but also different bars of the same metal that are not manufactured at the same time, and exactly in the same manner, are found by a good pyrometer to differ materially in their degrees of expansion and contraction, a very small change affecting one and not the other.”

The expansion or contraction of straight-grained fir *Fir Pendulum* wood lengthwise, by change of temperature, is so small, ^{lum.} that it is found to make very good pendulum rods. The wood called *sapadillo* is said to be still better. There is good reason to believe, that the previous baking, varnishing, gilding, or soaking of these woods in any melted matter, only tends to impair the property that renders them valuable. They should be simply rubbed on the outside with wax and a cloth. In pendulums of this construction the error is greatly diminished, but not taken away.

Angular PENDULUM. is formed of two pieces or legs ^{Angular Pendulum;} like a sector, and is suspended by the angular point. This pendulum was invented with a view to diminish the length of the common pendulum, but at the same time to preserve or even increase the time of vibration. In this pendulum, the time of vibration depends on the length of the legs, and on the angle contained between them conjointly, the duration of the time of vibration increasing with the angle. Hence a pendulum of this construction may be made to oscillate in any given time. At the lower extremity of each leg of the pendulum is a ball or bob as usual. It may be easily shown, that in this kind of a pendulum, the squares of the times of vibration are as the secants of half the angle contained by the legs: hence if a pendulum of this construction vibrates half seconds when its legs are close, it will vibrate whole seconds when the legs are opened, so as to contain an angle equal to $151^{\circ} 2\frac{1}{2}'$.

The Conical or Circular PENDULUM, is so called ^{Conical or Circular Pendulum.} from the figure described by the string or ball of the pendulum. This pendulum was invented by Mr Huygens, and is also claimed by Dr Hook.

In order to understand the principles of this pendulum, it will be necessary to premise the following lemma, viz. the times of all the circular revolutions of a heavy globular body, revolving within an inverted hollow paraboloid, will be equal whatever be the radii of the circles described by that body.

In order, therefore, to construct the pendulum so that its ball may always describe its revolutions in a paraboloid surface, it will be necessary that the rod of the pendulum be flexible, and that it be suspended in such a manner as to form the evolute of the given parabola. Hence, let KH (fig. 9.) be an axis perpendicular to the horizon, having a pinion at K moved by the last wheel in the train of the clock; and a hardened steel point at H moving in an agate pivot, to render the motion as free as possible. Now, let it be required that the pendulum shall perform each revolution in a second, then the paraboloid surface it moves in must be such whose *latus rectum* is double the length of the common half second pendulum. Let O be the focus of the parabola MEC, and MC the *latus rectum*; and make AE=MO=MC=the length of a common half second pendulum. At the point A of the verge, let a thin plate AB be fixed at one end, and at the other end B let it be fastened to a bar or arm BD perpendicular to the axis KH.

Pendulum
||
Penelope.

pendicular to DH, and to which it is fixed at the point D. The figure of the plate AB is that of the evolute of the given parabola MEC.

The equation of this evolute, being also that of the femicubical parabola, is $\frac{27}{16} p x^2 = y^3$.—Let $\frac{27}{16} p = P$; then $P x^2 = y^3$, and in the focus $P = 2y$. In this case

$2x^2 = y^2 = \frac{1}{2} P^2$: hence $x^2 = \frac{1}{4} P^2$, and $x = P \sqrt{\frac{1}{8}} = \frac{27}{16}$

$p \sqrt{\frac{1}{8}}$ = the distance of the focus from the vertex A.—By assuming the value of x , the ordinates of the curve may be found; and hence it may be easily drawn.

The string of the pendulum must be of such a length that when one end is fixed at B, it may lie over the plate AB, and then hang perpendicular from it, so that the centre of the bob may be at E when at rest. Now, the verge KH being put into motion, the ball of the pendulum will begin to gyrate, and thereby conceive a centrifugal force which will carry it out from the axis to some point F, where it will circulate seconds or half seconds, according as the line AE is 9.8 inches, or $2\frac{1}{2}$ inches, and AB answerable to it.

One advantage possessed by a clock having a pendulum of this construction is, that the second hand moves in a regular and uniform manner, without being subject to those jerks or starts as in common clocks; and the pendulum is entirely silent.

Theory has pointed out several other pendulums, known by the names of *Elliptic*, *Horizontal*, *Rotatory*, &c. pendulums. These, however, have not as yet attained that degree of perfection as to supplant the common pendulum.

Besides the use of the pendulum in measuring time, it has also been suggested to be a proper standard for measures of length. See the article MEASURE.

PENEA, in botany: A genus of the monogynia order, belonging to the tetrandria class of plants; and in the natural method ranking with those of which the order is doubtful. The calyx is diphyllous; the corolla campanulate; the style quadrangular; the capsule tetragonal, quadrilocular, and octospermous.

PENELOPE, in fabulous history, the daughter of Icarus, married Ulysses, by whom she had Telemachus. During the absence of Ulysses, who was gone to the siege of Troy, and who staid 20 years from his dominions, several princes, charmed with Penelope's beauty, told her that Ulysses was dead, offered to marry her, and pressed her to declare in their favour. She promised compliance on condition they would give her time to finish a piece of tapestry she was weaving; but at the same time she undid in the night what she had done in the day, and by this artifice eluded their importunity till Ulysses's return.

PENELOPE, in ornithology: A genus of birds of the order of gallinæ, the characters of which are: The beak is bare at the base; the head is covered with feathers; the neck is quite bare; the tail consists of twelve principal feathers; and the feet are for the most part bare. Linnaeus, in the *Systema Naturæ*, enumerates six species. 1. *Melagris fasyra*, or horned pheasant. Latham calls it the horned turkey. This species is larger than a fowl, and smaller than a turkey. The colour of the bill is brown; the nostrils, forehead,

and space round the eyes, are covered with slender black hairy feathers; the top of the head is red. Behind each eye there is a fleshy callous blue substance like a horn, which tends backward. On the fore-part of the neck and throat, there is a loose flap of a fine blue colour, marked with orange spots, the lower part of which is beset with a few hairs; down the middle it is somewhat looser than on the sides, being wrinkled. The breast and upper part of the back are of a full red colour. The neck and breast are inclined to yellow. The other parts of the plumage and tail are of a rufous brown, marked all over with white spots, encompassed with black. The legs are somewhat white, and furnished with a spur behind each. A head of this bird, Mr Latham tells us, was sent to Dr Mead from Bengal, together with a drawing of the bird, which was called *napaul-pheasant*. It is a native of Bengal.

2. The *melagris cristata*, called by Ray *penelope jacupene*, and by Edwards the *guan*, or *quan*, is about the size of a fowl, being about two feet six inches long.—The bill is two inches long, and of a black colour; the irides are of a dirty orange colour; the sides of the head are covered with a naked purplish blue skin, in which the eyes are placed: beneath the throat, for an inch and a half, the skin is loose, of a fine red colour, and covered only with a few hairs. The top of the head is furnished with long feathers, which the bird can erect as a crest at pleasure; the general colour of the plumage is brownish black, glossed over with copper in some lights; but the wing coverts have a greenish and violet gloss. The quills mostly incline to a purple colour; the fore-part of the neck, breast, and belly, are marked with white spots; the thighs, under tail coverts, and the tail itself, are brownish black; the legs are red; the claws black. Some of these birds have little or no crest, and are thence supposed to be females.—They inhabit Brasil and Guiana, where they are often made tame. They frequently make a noise not unlike the word *jacu*. Their flesh is much esteemed.

3. *Craze Cumanensis*, called by Latham, &c. *jacou*. It is bigger than a common fowl. The bill is black; the head feathers are long, pointed, and form a crest, which can be erected at pleasure. The irides are of a pale rufous colour; the space round the eyes is naked, similar to that of a turkey. It has also a naked membrane, or kind of *wattle*, of a dull black colour.—The blue skin comes forward on the bill, but is not liable to change colour like that of the turkey. The plumage has not much variation; it is chiefly brown, with some white markings on the neck, breast, wing coverts, and belly; the tail is composed of twelve feathers, pretty long, and even at the end; the legs are red. This species inhabits Cayenne, but is a very rare bird, being met with only in the inner parts, or about the Amazons country, though in much greater plenty up the river Oyapoc, especially towards Camoupi; and indeed those which are seen at Cayenne are mostly tame ones, for it is a familiar bird, and will breed in that state, and mix with other poultry. It makes the nest on the ground, and hatches the young there, but is at other times mostly seen on trees. It frequently erects the crest, when pleased, or taken notice of, and likewise spreads the tail upright like a fan, in the manner of the turkey. It has two kinds of cry; one like that

Plate
CCCLXXXI.

Fig. 1.

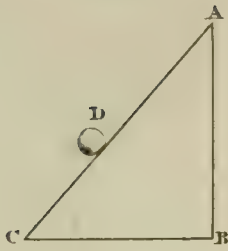


Fig. 2.

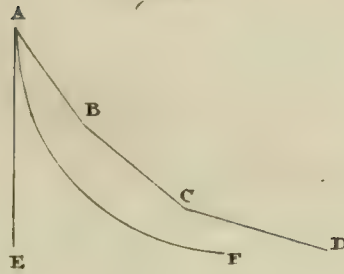


Fig. 8.



Fig. 7.



Fig. 4.

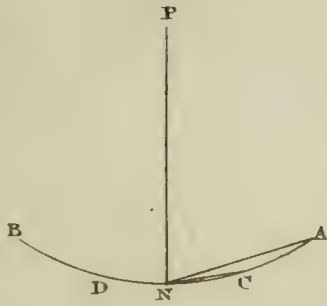


Fig. 3.

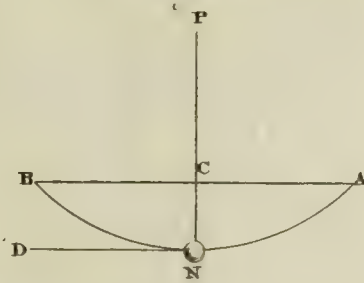


Fig. 5.

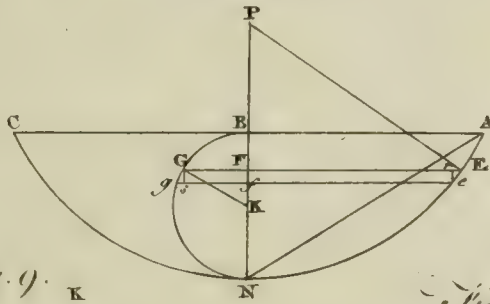


Fig. 9.

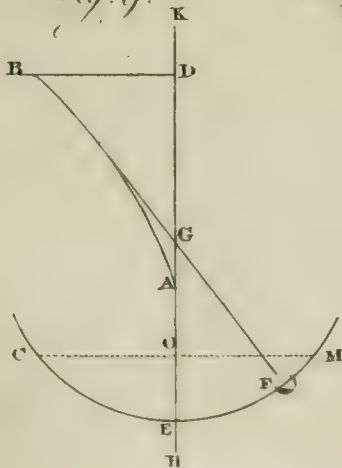
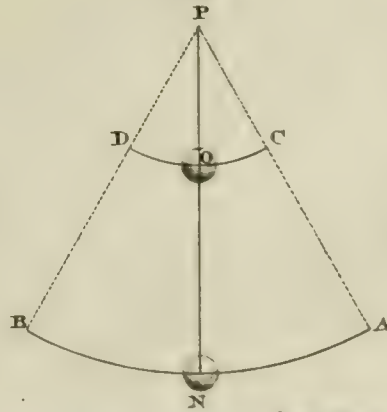


Fig. 6.



A Ball, when it strikes the point, gives

Penelope. that of a young turkey, the other lower and more plaintive; the first of these is thought by the Indians to express the word *couyovoit*, the other *yacou*.

4. The *pipile*, or, as it is called, *crax pipile*, is black in the belly, and the back brown stained with black. The flesh on the neck is of a green colour. It is about the bigness of the former, and has a hissing noise.—The head is partly black and partly white, and is adorned with a short crest. The space about the eyes, which are black, is white; the feet are red. It inhabits Guiana.

5. The *marail* is about the size of a fowl, and shaped somewhat like it. The bill and irides are blackish; the space round the eyes is bare, and of a pale red; the chin, throat, and fore-part of the neck, are scarcely covered with feathers; but the throat itself is bare, and the membrane elongated to half an inch or more; both this and the skin round the eyes change colour, and become deeper and thicker when the bird is irritated. The head feathers are longish, so as to appear like a crest when raised up, which the bird often does when agitated; at which time it also erects those of the whole body, and so disfigures itself as to be scarce known: the general colour of the plumage is a greenish black; the fore-part of the neck is tipped with white; the wings are short; the tail is long, consisting of 12 feathers, which are even at the end, and commonly pendent, but can be lifted up, and spread out like that of the turkey; the legs and toes are of a bright red; the claws are crooked, and somewhat sharp. In a collection (says Latham) from Cayenne was a bird, I believe, of this very species. It was 28 inches long; the bill is like that of a fowl, brown, and rather hooked; round the eye bare; the head is crested; the feathers of the fore-part of the neck are tipped with white; the breast and belly are rufous brown; the rest of the plumage is greenish brown; the tail is 11 inches long, and rounded at the end; the quills just reach beyond the rump; the legs are brown, and the claws hooked. This species is common in the woods of Guiana, at a distance from the sea, though it is much less known than could be imagined; and found in small flocks for the most part, except in breeding-time, when it is only seen by pairs, and then frequently on the ground, or on low shrubs; at other times on high trees, where it roosts at night. The female makes her nest on some low bushy tree, as near the trunk as possible, and lays three or four eggs. When the young are hatched, they descend with their mother, after 10 or 12 days. The mother acts as other fowls, scratching on the ground like a hen, and brooding the young, which quit their nurse the moment they can shift for themselves. They have two broods in a year; one in December or January, the other in May or June. The best time of finding these birds is morning or evening, being then met with on such trees whose fruit they feed on, and are discovered by some of it falling to the ground. The young birds are easily tamed, and seldom forsake the places where they have been brought up: they need not be housed, as they prefer the roosting on tall trees to any other place. Their cry is not inharmonious, except when irritated or wounded, when it is harsh and loud. Their flesh is much esteemed.

Buffon supposes this bird to be the female of the *yacou*, or at least a variety; but that this cannot be,

the anatomical inspection will at once determine. The windpipe of this bird has a singular construction, passing along the neck to the entrance of the breast, where it rises on the outside of the flesh, and, after going a little way downwards, returns, and then passes into the cavity of the lungs. It is kept in its place on the outside by a muscular ligament, which is perceivable quite to the breast-bone. This is found to be the case in both male and female, and plainly proves that it differs from the *yacou*, whose windpipe has no such circumvolution in either sex.

If this be the bird mentioned by Fermin, in his History of Guiana, p. 176. he says that the crest is cuneiform, and of a black and white colour; and observes that they are scarce at Surinam; but it does not seem quite certain whether he means this species or the *yacou*.

Bancroft mentions a bird of Guiana by the name of *Marrodee*, which he says is wholly of a brownish black: the bill the same; and the legs grey. These, he says, are common, and make a noise not unlike the name given it, perching on trees. The Indians imitate their cry so exactly, as to lead to the discovery of the place the birds are in, by their answering it. The flesh of them is like that of a fowl: it is therefore most likely the *marail*.

6. The *vociferating penelope*. The bill of this bird is of a greenish colour: the back is brown, the breast green, and the belly is of a whitish brown. Latham calls it the *crying curassaw*. It is about the bigness of a crow.

PENESTICA, (Antonine), a town of the Helvetii, situated between the Lacus Lanconius and Salodurum; called *Petenisca* by Peutinger. Thought now to be *Biel*, (Cluverius); the capital of a small territory in Switzerland.

PENEUS, (Strabo); a river running through the middle of Thessaly, from west to east, into the Sinus Thermaicus, between Olympus and Ossa, near Tempe of Thessaly, rising in mount Pindus, (Ovid, Val. Flaccus).

PENETRALE, a sacred room or chapel in private houses, which was set apart for the worship of the household gods among the ancient Romans. In temples also there were *penetralia*, or apartments of distinguished sanctity, where the images of the gods were kept, and certain solemn ceremonies performed.

PENGUIN, or PINGVIN. See PINGVIN.

PENICILLUS, among surgeons, is used for a tent to be put into wounds or ulcers.

PENIEL, or PENUEL, a city beyond Jordan, near the ford or brook Jabbok. This was the occasion of its name. Jacob, upon his return from Mesopotamia, (Gen. xxxii. 24, &c.) made a stop at the brook Jabbok: and very early the next morning, after he had sent all the people before, he remained alone, and behold an angel came, and wrestled with him till the day began to appear. Then the angel said to Jacob, Let me go, for the morning begins to appear. Jacob answered, I shall not let you go from me till you have given me your blessing. The angel blessed him then in the same place, which Jacob thence called Peniel, saying, I have seen God face to face, yet continue alive.

In following ages the Israelites built a city in this place, which was given to the tribe of Gad. Gideon, returning

Penelios

Peniel.

Peninah
Penitents

returning from the conquest of the Medianiter, overthrow the tower of Penel, (Judges viii. 12), and put all the inhabitants of the city to death, for having refused to submit to him and his people, and having attacked him in a very insulting manner. Jeroboam the son of Nebat built the city of Penel, (1 Kings xii. 25.) Jeroboam says, that this prince there built himself a palace.

PENINNAH, the second wife of Elkanah, the father of Samuel. Peninnah had several children, (1 Sam. i. 2, 3, &c.), but Hannah, who afterwards was mother of Samuel, was for a great while barren: Peninnah, instead of giving the glory to God, the author of fruitfulness, was elevated with pride, and insulted her rival Hannah. But the Lord having visited Hannah, Peninnah was thereby humbled; and some interpreters think, that God took away her children from her, or at least that she had no more after this time, according to the words of the song of Hannah, (1 Sam. ii. 5.), "The barren hath born seven, and she that hath many children is waxed feeble."

PENINSULA, in geography, a portion or extent of land joining to the continent by a narrow neck or isthmus, the rest being encompassed with water. See Plate CCXII.

PENIS, in anatomy. See there, p. 738. col. 2. &c.

PENITENCE, is sometimes used for a state of repentance, and sometimes for the act of repenting. See REPENTANCE. It is also used for a discipline, or punishment attending repentance; more usually called *penance*. It also gives title to several religious orders, consisting either of converted debauchees, and reformed prostitutes, or of persons who devote themselves to the office of reclaiming them. Of this latter kind is the

Order of PENITENCE of St Magdalen, established about the year 1272 by one Bernard, a citizen of Marseilles, who devoted himself to the work of converting the courtizans of that city. Bernard was seconded by several others; who, forming a kind of society, were at length erected into a religious order by Pope Nicholas III. under the rule of St Augustine. F. Gefnay says, that they also made a religious order of the penitents, or women they converted, giving them the same rules and observances which they themselves kept.

Congregation of PENITENCE of St Magdalen at Paris, owed its rise to the preaching of F. Tisseran, a Franciscan, who converted a vast number of courtizans about the year 1492. Louis duke of Orleans gave them his house for a monastery; or rather, as appears by their constitutions, Charles VIII. gave them the hotel called *Bochaigne*, whence they were removed to St George's chapel, in 1572. By virtue of a brief of Pope Alexander, Simon bishop of Paris, in 1497, drew them up a body of statutes, and gave them the rule of St Augustine. It was necessary, before a woman could be admitted, that she had first committed the sin of the flesh. None were admitted who were above 35 years of age. Till the beginning of the last century, none but penitents were admitted; but since its reformation by Mary Alvequin, in 1616, none have been admitted but maids, who, however, still retain the ancient name penitents.

PENITENTS, an appellation given to certain fra-

ternities. penitents distinguished by the different shape and colour of their habits. These are secular societies, who have their rules, statutes, and churches, and make public processions under their particular crosses or banners. Of these there are more than a hundred, the most considerable of which are as follows: the white penitents, of which there are several different sorts at Rome, the most ancient of which was constituted in 1264; the brethren of this fraternity every year give portions to a certain number of young girls, in order to their being married: their habit is a kind of white sackcloth, and on the shoulder is a circle, in the middle of which is a red and white cross. Black penitents, the most considerable of which are the brethren of mercy, instituted in 1488 by some Florentines, in order to assist criminals during their imprisonment, and at the time of their death: on the day of execution, they walk in procession before them, singing the seven penitential psalms and the litanies; and after they are dead, they take them down from the gibbet and bury them; their habit is black sackcloth. There are others whose business it is to bury such persons as are found dead in the streets: these wear a death's head on one side of their habit. There are also blue, grey, red, green, and violet penitents; all which are remarkable for little else besides the different colours of their habits.

Maillon tells us, that at Turin there are a set of penitents kept in pay to walk through the streets in procession, and cut their shoulders with whips, &c.

PENITENTS, or Converts of the Name of Jesus, a congregation of religious at Seville in Spain, consisting of women who had led a licentious life, founded in 1550. This monastery is divided into three quarters: one for professed religious; another for novices; a third for those who are under correction. When these last give signs of a real repentance, they are removed into the quarter of the novices, where, if they do not behave themselves well, they are remanded to their correction. They observe the rule of St Augustine.

PENITENTS of Orvieto, are an order of nuns, instituted by Antony Simoncelli, a gentleman of Orvieto in Italy. The monastery he built was at first designed for the reception of poor girls, abandoned by their parents, and in danger of losing their virtue. In 1662 it was erected into a monastery, for the reception of such as, having abandoned themselves to impurity, were willing to take up, and consecrate themselves to God by solemn vows. Their rule is that of the Carmelites.

These religious have this in peculiar, that they undergo no noviciate. All required is, that they continue a few months in the monastery in a secular habit; after which they are admitted to the vows.

PENITENTIAL, an ecclesiastical book retained among the Romanists; in which is prescribed what relates to the imposition of penance and the reconciliation of penitents. See PENANCE.

There are various penitentials, as the Roman penitential, that of the venerable Bede, that of Pope Gregory III. &c.

PENITENTIARY, in the ancient Christian church, a name given to certain presbyters or priests, appointed in every church to receive the private confessions of the people, in order to facilitate public discipline, by acquainting them what sins were to be expiated

Penitents
Penitentiary

plated by public penance, and to appoint private penance for such private crimes as were not proper to be publicly censured.

PENITENTIARY, at the court of Rome, is an office in which are examined and delivered out the secret bulls, graces, or dispensations relating to cases of conscience, confessions, &c.

PENITENTIARY, is also an officer, in some cathedrals, vested with power from the bishop to absolve, in cases reserved to him. The pope has at present his grand penitentiary, who is a cardinal, and the chief of the other penitentiary priests established in the church of Rome, who consult him in all difficult cases. He presides in the penitentiary, dispatches dispensations, absolutions, &c. and has under him a regent and 24 proctors, or advocates of the sacred penitentiary.

PENMAN-MAWR, a mountain in Caernarvonshire, 1400 feet high. It hangs perpendicularly over the sea, at so vast a height, that few spectators are able to look down the dreadful steep. On the side which is next the sea, there is a road cut out of the side of the rock, about six or seven feet wide, which winds up a steep ascent, and used to be depended on one side only by a slight wall, in some parts about a yard high, and in others by only a bank, that scarce rose a foot above the road. The sea was seen dashing its waves 40 fathoms below, with the mountain rising as much above the traveller's head. This dangerous road was a few years ago secured by a wall breast-high, to the building of which the city of Dublin largely contributed, it being in the high road to Holyhead.

PENN (Sir William), was born at Bristol in 1621, and inclined from his youth to maritime affairs. He was made captain at 21 years of age, rear-admiral of Ireland at 23, vice-admiral of Ireland at 25, admiral to the Straits at 29, vice-admiral of England at 31, and general in the first Dutch war at 32. Whence returning in 1655, he was chosen representative for the town of Weymouth; and in 1660 was made commissioner of the admiralty and navy, governor of the town and fort of Kinsale, vice-admiral of Munster, and a member of that provincial council. In 1664 he was chosen great captain-commander under the duke of York, and distinguished himself in an engagement against the Dutch fleet; after which he took leave of the sea, but continued in his other employments till 1669. He died in 1670.

PENN (William), an eminent writer among the Quakers, and the planter and legislator of Pennsylvania, was the son of the above Sir William Penn, and was born at London in 1644. In 1660, he was entered a gentleman commoner of Christ-church, in Oxford; but having before received an impression from the preaching of one Thomas Loe a Quaker, withdrew with some other students from the national worship, and held private meetings, where they preached and prayed amongst themselves. This giving great offence to the heads of the college, Mr Penn, though but 16 years of age, was fined for nonconformity; and continuing his religious exercises, was at length expelled his college. Upon his return home, he was, on the same account, treated with great severity by his father, who at last turned him out of doors; but his resentment afterwards abating, he sent him to France in company with some persons of quality; where he continued a

considerable time, and returned not only well skilled in the French language, but a polite and accomplished gentleman. About the year 1666, his father committed to his care a considerable estate in Ireland. Being found in one of the Quakers meetings in Cork, he, with many others, was thrown into prison; but, on his writing to the earl of Orrery, was soon discharged. However, his father being informed he still adhered to his opinions, sent for him to England, and finding him inflexible to all his arguments, turned him out of doors a second time. About the year 1668, he became a public preacher among the Quakers; and that year was committed close prisoner to the Tower, where he wrote several treatises. Being discharged after seven months imprisonment, he went to Ireland, where he also preached amongst the Quakers. Returning to England, he was in 1670 committed to Newgate, for preaching in Gracechurch-street meeting-house, London; but being tried at the sessions-house in the Old Bailey, he was acquitted. In September the same year, his father died; and being perfectly reconciled to him, left him both his paternal blessing and a plentiful estate. But his persecutions were not yet at an end; for in 1671 he was committed to Newgate for preaching at a meeting in Wheeler-street, London; and during his imprisonment, which continued six months, he also wrote several treatises. After his discharge, he went into Holland and Germany; and in the beginning of the year 1672, married and settled with his family at Rickmansworth in Hertfordshire. The same year he published several pieces; and particularly one against Reeve and Muggleton. In 1677, he again travelled into Holland and Germany in order to propagate his opinions; and had frequent conversations with the princess Elizabeth, daughter to the queen of Bohemia, and sister to the princess Sophia, mother to king Geo. I. In 1681, king Charles II. in consideration of the services of Mr Penn's father, and several debts due to him from the crown at the time of his decease, granted Mr Penn and his heirs the province lying on the west side of the river Delaware in North America, which from thence obtained the name of *Pennsylvania*. Upon this Mr Penn published a brief account of that province, with the king's patent; and proposing an easy purchase of lands, and good terms of settlement for such as were inclined to remove thither, many went over. These having made and improved their plantations to good advantage, the governor, in order to secure the planters from the native Indians, appointed commissioners to purchase the land he had received from the king of the native Indians, and concluded a peace with them. The city of Philadelphia was planned and built; and he himself drew up the fundamental constitutions of Pennsylvania in 24 articles. In 1681, he was elected a member of the Royal Society; and the next year he embarked for Pennsylvania, where he continued about two years, and returned to England in August 1684. Upon the accession of King James to the throne, he was taken into a great degree of favour with his Majesty, which exposed him to the imputation of being a Papist; but from which he fully vindicated himself. However, upon the Revolution, he was examined before the council in 1688, and obliged to give security for his appearance on the first day of next term, which was afterwards continued. He was several times dis-

Penn.

charged

Penn. charged and examined; and at length warrants being
Pennatula issued out against him, he was obliged to conceal himself for two or three years. Being at last permitted to appear before the king and council, he represented his innocence so effectually that he was acquitted. In August 1699, he, with his wife and family, embarked for Pennsylvania; whence he returned in 1701, in order to vindicate his proprietary right, which had been attacked during his absence. Upon Queen Anne's accession to the crown, he was in great favour with her, and was often at court. But, in 1707, he was involved in a lawsuit with the executors of a person who had been formerly his steward; and, though many thought him aggrieved, the court of chancery did not think proper to relieve him; upon which account he was obliged to live within the rules of the Fleet for several months, till the matter in dispute was accommodated. He died in 1718.

At one period of his life, Penn lodged in a house in Norfolk-street in the Strand. In the entrance to it he had a peeping-hole, through which he could see any person that came to him. A creditor one day sent in his name, and having been made to wait more than a reasonable time, he knocked for the servant, whom he asked, "Will not thy master see me?" "Friend (answered the servant) he has seen thee, but he does not like thee."

Mr Penn's friendly and pacific manner of treating the Indians produced in them an extraordinary love for him and his people; so that they have maintained a perfect amity with the English in Pennsylvania ever since. He was the greatest bulwark of the Quakers; in whose defence he wrote numberless pieces. Besides the above works, he wrote a great number of others; the most esteemed of which are, 1. His Primitive Christianity revived. 2. His defence of a paper, intitled *Gospel Truths, against the Exceptions of the Bishop of Cork*. 3. His Persuative to Moderation. 4. His Good Advice to the Church of England, Roman Catholic, and Protestant Dissenter. 5. The Sandy Foundation shaken. 6. No Cross, no Crown. 7. The great Case of Liberty of Conscience debated. 8. The Christian Quaker and his Testimony stated and vindicated. 9. A Discourse of the general Rule of Faith and Practice, and Judge of Controversy. 10. England's Present Interest considered. 11. An Address to Protestants. 12. His Reflections and Maxims. 13. His Advice to his Children. 14. His Rise and Progress of the People called Quakers. 15. A Treatise on Oaths. Most of these have passed several editions, some of them many. The letters between William Penn and Dr Tillotson, and William Penn and William Popple, Esq; together with Penn's letters to the princess Elizabeth of the Rhine, and the countess of Hornes, as also one to his wife on his going to Pennsylvania, are inserted in his works, which were first collected and published in 2 vols folio; and the parts since selected and abridged into 1 vol. folio, are very much and deservedly admired for the good sense they contain.

PENNATULA, or **SEA-PEN**, in natural history, a genus of zoophyte, which, though it swims about freely in the sea, approaches near to the gorgonia. This genus hath a bone along the middle of the inside, which is its chief support; and this bone re-

ceives the supply of its osseous matter by the same polype mouths that furnish it with nourishment. Linnaeus reckons seven species. The name *zoophytes* under which this genus is ranked, it is well known signifies, that the creature partakes both of the animal and vegetable nature; but some have supposed it to be nothing more but a fucus or sea plant. It is certainly an animal, however, and as such is free or locomotive. Its body generally expands into processes on the upper parts, and these processes or branches are furnished with rows of tubular denticles: they have a polype head proceeding from each tube.

The sea-pen is not a coralline, but distinguished from it by this specific difference, corals, corallines, alcyoonia, and all that order of beings, adhere firmly by their bases to submarine substances, but the sea-pen either swims about in the water or floats upon the surface.

The Honourable Dr Coote Molesworth lately sent one of these animals to the ingenious Mr Ellis, the author of many curious papers on the nature of coralines, which was taken in a trawl in 72 fathoms water, near the harbour of Brest in France: the same species are frequently found in the ocean from the coast of Norway to the Mediterranean sea, sometimes at considerable depths, and sometimes floating on the surface. Mr Ellis's description of that sent him by Dr Molesworth is as follows:

Its general appearance greatly resembles that of a quill feather of a bird's wing (see Plate CCCLXXXVIII. fig. 1.); it is about four inches long, and of a reddish colour; along the back there is a groove from the quill part to the extremity of the feathered part, as there is in a pen; the feathered part consists of fins proceeding from the stem, as expressed in the figure. The fins move the animal backward and forward in the water, and are furnished with suckers or mouths armed with filaments, which appear magnified as fig. 2. There is no perforation at the bottom, and therefore Mr Ellis is of opinion, that the exuvia of the animals upon which it feeds are discharged by the same apertures at which the food is taken in; and in this it is not singular, Nature having observed the same œconomy in the Greenland polype, described by Mr Ellis in his Essay on Coralines. Each sucker has eight filaments, which are protruded when prey is to be caught; but at other times they are drawn back into their cases, which are furnished at the end with *spiculae*, that close together round the entrance, and defend this tender part from external injuries.

Dr Bohadsch of Prague had an opportunity of observing one of these animals alive in the water, and he gives the following account of what he saw: "A portion of the stem contracted, and became of a strong purple colour, so as to have the appearance of a ligature round it; this apparent ligature, or zone, moved upwards and downwards successively through the whole length of the stem, as well the feathered as the naked part; it began at the bottom, and moving upwards to the other extremity, it there disappeared, and at the same instant appeared again at the bottom, and ascended as before; but as it ascended through the feathered or pinnated part, it became paler. When this zone is much constricted, the trunk above it swells, and acquires the form of an onion; the contraction

friction of the trunk gives the colour to the zone, for the intermediate parts are paler in proportion as the zone becomes deeper. The end of the naked trunk is sometimes curved like a hook; and at its extremity there is a sinus or chink, which grows deeper while the purple ring is ascending, and shallower as it is coming down. The fins have four motions, upward and downward, and backward and forward, from right to left, and from left to right. The fleshy filaments, or claws, move in all directions; and with the cylindrical part from which they proceed are sometimes protruded from the fins, and sometimes hidden with them.

Upon dissecting this animal the following phenomena were discovered. When the trunk was opened lengthwise, a saltish liquor flowed out of it, so viscid as to hang down an inch. The whole trunk of the stem was found to be hollow, the outward membrane being very strong, and about a tenth part of an inch thick: within this membrane appeared another much thinner; and between these two membranes, in the pinnated part of the trunk, innumerable little yellowish eggs, about the size of a white poppy-seed, were seen floating in a whitish liquor; about three parts of the cavity within the inner membrane is filled by a kind of yellowish bone: this bone is about two inches and an half long, and one twentieth of an inch thick; in the middle it is four square, but towards the ends it grows round and very taper, that end being finest which is next the pinnated part of the trunk. This bone is covered in its whole length with a clear yellowish skin, which at each end runs out into a ligament; one is inserted in the top of the pinnated trunk, and the other in the top of the naked trunk: by the help of the upper ligament the end of the bone is either bent into an arch, or disposed in a straight line. The fins are composed of two skins; the outward one is strong and leathery, and covered over with an infinite number of crimson streaks; the inner skin is thin and transparent: the suckers are also in the same manner composed of two skins, but the outward skin is something softer. Both the fins and suckers are hollow, so that the cavity of the suckers may communicate with those of the fins, as the cavity of the fins does with that of the trunk.

Dr Shaw, in the History of Algiers, says, that these animals are so luminous in the water, that in the night the fishermen discover fishes swimming about in various depths of the sea by the light they give: From this extraordinary quality Linnæus calls this species of the sea-pen, *pennatula phosphorea*, and remarks, after giving the synonymes of other authors, *Habitat in oceano fundum illuminans*.

There are other kinds of sea-pens, or species of this animal, which have not a resemblance to a pen. There is the kidney shaped sea-pen (see fig. 3.), the feather of the peacock fish (see fig. 4.), the pennatula filosa of Linnæus (see fig. 5.), his pennatula sagitta (see fig. 6.), his pennatula mirabilis (see fig. 7.), and the finger-shaped sea-pen (see fig. 8.). The kidney shaped sea-pen was discovered some time ago on the coast of South Carolina, and sent to Mr Ellis by John Gregg, Esq; of Charlestown. It is of a fine purple colour; the kidney part is about an inch from end to end, and about half an inch wide in the narrowest part; a tail proceeds from the middle of the body, which is roundish, and about an inch long; is also full of rings like

an earth-worm, and along the middle both of the upper and under part of it there is a small groove which runs from one end to the other, but there is no perforation at either extremity. The upper part of the body is convex, and about an inch thick; the whole surface is covered with small yellow starry openings, through which little suckers are protruded, each furnished with six tentacula, or filaments, like what are observed on some corals; the under part of the body is quite flat, and is full of ramifications of fleshy fibres, which proceeding from the insertion of the tail, as a common centre, branch out so as to communicate with the starry openings on the exterior edge and upper surface of the animal. Of all the pennatulæ yet known the feather-shaped one, or as it is called the *silver sea-pen* (see fig. 1), is the largest as well as the most specious in its appearance. It is of a beautiful silvery white, elegantly striated on each of the feather-like processes with lines or streaks of the deepest black. It is very rare, and is a native of the Indian seas. There is a very fine specimen of this species in the British Museum.

PENNI (Giovanni Francisco), born at Florence in 1488, was the disciple of Raphael, who observing his genius and integrity, intrusted his domestic concerns entirely to his management; by which means he got the appellation of *il fattore*, or the "steward," which he retained ever after. The genius of Penni was universal; but his greatest pleasure was in painting landscapes and buildings: he was an excellent designer, and coloured extremely well in oil, distemper, and fresco. He painted portraits in an exquisite style; and had such happy natural talents, that Raphael left him heir to his fortune in partnership with Julio Romano his fellow-disciple. After Raphael's death, Penni painted many pictures at Rome, particularly in the palace of Chigi, so exactly in the style of his master, that they might not undeservedly have been imputed to him: he finished, in conjunction with Julio and Pierino del Vaga, the celebrated designs of the battles of Constantine, and others, which Raphael had left imperfect; but differing with them about a copy of the transfiguration, which the pope intended for the king of France, they separated. Penni went to Naples; but the air of that country disagreeing with his constitution, he died soon after in 1528. He had a brother called *Lucca Penni*, who worked at Genoa and other parts of Italy in conjunction with Pierino del Vaga, who married his sister; he went thence to England, where he worked for Henry VIII. and for several merchants; was employed by Francis I. at Fountainbleau; but at last quitted the pencil, and devoted himself to engraving.

PENNY, or PENY, in commerce, an ancient English coin, which had formerly considerable course; but is now generally dwindled into an imaginary money, or money of account. Camden derives the word from the Latin *pecunia*, "money."

The ancient English penny, penig, or pening, was the first silver coin struck in England; nay, and the only one current among our Saxon ancestors: as is agreed by Camden, Spelman, Dr Hicks, &c.

The penny was equal in weight to our three-pence; five of them made one shilling, or seilling Saxon; 30 a mark or mancuse, equal to our 7s. 6d.

Till the time of King Edw. I. the penny was struck with a cross, so deeply indented in it, that it might be easily

Penni,
Penny.

*Penny,
1 unit.*

easily broke, and parted, on occasion, into two parts, thence called *half-pennies*; or into four, thence called *fourthings*, or *farthings*. But that prince coined it without indenture; in lieu of which, he first struck round halfpence and farthings.

He also reduced the weight of the penny to a standard; ordering that it should weigh 32 grains of wheat, taken out of the middle of the ear — This penny was called the *penny sterling*.—Twenty of these pence were to weigh an ounce; whence the penny became a weight as well as a coin. See STERLING and PRACTICAL WEIGHT.

The penny sterling is now nigh disused as a coin; and scarce fishes, but as a money of account, containing the twelfth part of a shilling, or the 144th part of a pound.

PENNY, in ancient statutes, &c. is used for all silver money. And hence the *ward-penny*, *aver-penny*, *hundred-penny*, *silver penny*, and *brother penny*.

Penny weight, a Troy weight, containing 24 grains; each grain weighing a grain of wheat gathered out of the middle of the ear, well dried. The name took its rise hence, that this was anciently the weight of one of our ancient silver pennies. See PENNY.

Twenty of these penny-weights make an ounce Troy.

PENRITH, an ancient town of the county of Cumberland in England, seated under a hill called *Penrith-Fell*, near the rivers Eamont and Lowther. It is a great thoroughfare for travellers; but has little other trade, except tanning, and a small manufacture of checks. Formerly it had a castle, but it is now in ruins. In the church-yard is a monument of great antiquity, consisting of two stone-pillars 11 feet 6 inches high, and 5 in circumference in the lower part, which is rounded; the upper is square, and tapers to a point; in the square part is some fret-work, and the relieve of a cross; and on the interior side of one is the faint representation of some animal. But these stones are mortified at their lower part into a round one: they are about 15 feet asunder, and the space between them is inclosed on each side with two very large but thin semicircular stones; so that there is left between pillar and pillar a walk of two feet in breadth. Two of these lesser stones are plain, the others have certain figures, at present scarce intelligible. Not far from these pillars is another called the *giant's thumb*, five feet eight inches high, with an expanded head, perforated on both sides; from the middle the stone rises again into a lesser head, rounded at top; but no part has a tendency to the figure of a cross, being in no part mutilated. The pillars are said to have been set up in memory of Sir Owen Cafarius, a famous warrior buried here, who killed so many wild bears, which much infested this county, that the figures of bears, cut out in stone, on each side of his grave, were set there in remembrance of the execution he made among those beasts; and it is likewise said his body extended from one pillar to the other. In the market-place there is a town-house of wood, beautified with bears climbing up a ragged staff. There is a memorandum on the north side of the vestry without, that, in 1598, 2266 persons died here of the plague. There is a charity school in this place for 20 boys, and another for 30 girls, maintained by 55 l. a year, by the sacrament-money and parish stock. In 1715 the Scotch

Hil.landers entered this town, and quartered in it for a night, in their way to Preston, without doing much harm; but in the left rebellion, in 1745, they were, it is said, very rapacious and cruel. Its handsome spacious church has been lately rebuilt, and the tower supported by pillars, whose shafts are of one entire reddish stone, dug out of a neighbouring quarry. On the east part of the parish, upon the north bank of the river Eamont, there are two caves or grottoes, dug out of the solid rock, and sufficient to contain 100 men. The passage to them is very narrow and dangerous; and it is possible that its perilous access may have given it the name of *the Parls*; though the vulgar tell strange stories of one Ihs, a giant, who lived there in former times, and, like Cacus of old, used to seize men and cattle, and draw them into his den to devour them. But it is highly probable, that these subterraneous chambers were made for a secure retreat in time of sudden danger; and the iron gates, which were taken away not long ago, seem to confirm that supposition. W. Long. 3. 16. N. Lat. 54. 35.

PENROSE (Thomas), was the son of the Reverend Mr Penrose, rector of Newbury, Berks, a man of high character and abilities, descended from an ancient Cornish family, beloved and respected by all who knew him. Mr Penrose, jun. being intended for the church, pursued his studies with success, at Christchurch, Oxon, until the summer of 1762, when his eager turn to the naval and military line overpowering his attachment to his real interest, he left his college, and embarked in the unfortunate expedition against Nova Colonia, in South America, under the command of Captain Macnamara. The issue was fatal. The Clive (the largest vessel) was burnt; and though the Ambuscade escaped (on board of which Mr Penrose, acting as lieutenant of marines, was wounded), yet the hardships which he afterwards sustained in a prize sloop, in which he was stationed, utterly ruined his constitution. Returning to England with ample testimonials of his gallantry and good behaviour, he finished, at Hertford College, Oxon, his course of studies; and having taken orders, accepted the curacy of Newbury, the income of which, by the voluntary subscription of the inhabitants, was considerably augmented. After he had continued in that station about nine years, it seemed as if the clouds of disappointment, which had hitherto overshadowed his prospects, and tinged his poetical essays with gloom, were clearing away; for he was then presented by a friend, who knew his worth and honoured his abilities, to a living worth near 500 l. per annum. It came, however, too late; for the state of Mr Penrose's health was now such as left little hope, except in the assistance of the waters of Bristol. Thither he went; and there he died in 1779, aged 36 years. In 1768 he married Miss Mary Slocock of Newbury, by whom he had one child, Thomas, who was educated at Winton College.

Mr Penrose was respected for his extensive erudition, admired for his eloquence, and equally beloved and esteemed for his social qualities. By the poor, towards whom he was liberal to his utmost ability, he was venerated to the highest degree. In oratory and composition his talents were great. His pencil was ready as his pen, and on subjects of humour had uncommon merit. To his poetical abilities the public, by their

Penryn, reception of his *Flights of Fancy*, &c. have given a favourable testimony. To sum up the whole, his figure and address were as pleasing as his mind was ornamented.

PENRYN, a town of Cornwall, in England, seated on a hill at the entrance of Falmouth-haven by Pendennis castle. It consists of about 300 houses; and the streets are broad and well paved. There are so many gardens and orchards in it, that it resembles very much a town in a wood. It is well watered with rivulets, and has an arm of the sea on each side of it, with a good customhouse and quay, and other neat buildings. It drives a considerable trade in pilch rils, and in the Newfoundland fishery. It was anciently governed by a portreeve; but James I. made it a corporation, consisting of a mayor, 11 aldermen, 12 common councilmen, with a recorder, steward, &c. an office of record every three weeks, with a prison, and power to try felons in their jurisdiction. And he granted, that the mayor and two aldermen should be justices of the peace, and that they should have a guildhall. There was once a monastery in this place, which was a cell to Korton; and there are still to be seen a tower, and part of the garden walls, the ruins of a collegiate church. It has neither church nor chapel, but belongs to the parish of Gwivias, a quarter of a mile off. It has sent members to parliament ever since the first year of Queen Mary; and James II. granted it a new charter, whereby their election was vested in the magistracy only; but it was never made use of, all the inhabitants that pay scot and lot, who are not much above 100, being the electors. Mr Rymcr gives a very remarkable account how Penryn was once saved by a company of strolling players. He says, that towards the latter end of the 16th century the Spaniards were landing to burn the town just as the players were setting *Santon* upon the Philistines; which performance was accompanied with such drumming and shouting, that the Spaniards thought some ambush was laid for them, and scampered back to their ships. Queen Elizabeth founded a free-school in this place. W. Long. 5. 35. N. Lat. 50. 23.

PENSACOLA, a settlement in North America, situated at the mouth of a river on the gulf of Mexico. It was established by the French, and ceded to Great Britain in 1763. Its first discoverer was Sebastian Cabot in 1497.

The year 1781, so disastrous to Britain in other respects, was also remarkable for the reduction of Pensacola by the Spaniards under Don Bernardo Galvez. Great preparations for this expedition had been making at the Havannah; but it was for some time retarded by a dreadful hurricane which attacked the Spanish fleet, and by which four ships of the line, besides others of inferior note, were lost, together with the people on board, to the amount of more than 2000. By this disaster the remainder were obliged to put back to the Havannah to repair; but as soon as the fleet was again judged capable of putting to sea, an embarkation was made of near 8000 men, with Don Bernardo at their head, together with five ships of the line, who arrived at Pensacola on the 9th of March 1781. This force was soon augmented by ten ships of the line and six frigates; while General Campbell, the British governor, could oppose such a formidable

armament with few more than 1000 men, consisting of some regulars and seamen, with the inhabitants. The entrance of the harbour, which was the principal object of defence, was guarded by two small armed vessels, but they were insufficient to second the batteries that had been erected for its protection; and these, without the assistance of some ships of force, were incapable of resisting a vigorous attack. Notwithstanding this prodigious odds, however, the Spaniards met with the most determined opposition. Every inch of ground was disputed with the greatest resolution. The harbour was not forced without the greatest difficulty, nor could the vessels be taken that defended it, the companies belonging to them, after setting them on fire, retired on shore.

The Spaniards, now in possession of the harbour, invested the place in form, and made their approaches in a cautious and regular manner; while, on the other hand, the besieged were no less active and valiant in their own defence. Sallies were made occasionally with great success, at the same time that an uninterrupted fire was kept up in such a manner as not only greatly to annoy, but even to make the besiegers with astonishment. This incensed the Spanish general the more, as he knew that the garrison could expect no relief, and therefore that all their efforts could only prolong the date of their surrender. The resistance was the more mortifying, as he was perfectly conscious of the bravery of his troops; and he had artillery fit, as his officers expressed themselves, "to be employed against Gibraltar." With all these advantages, however, so resolute was the defence of the garrison, that after the siege had continued for two months, very little hope could be entertained of its speedy termination. As they despaired therefore of making any effectual impression by means of their cannon, they erected a battery of mortars, with which they bombarded a redoubt that commanded the main avenue to the place; and in this they were favoured by an unexpected accident. On the 9th of May a shell burst open the door of the powder magazine under the redoubt, by which it was blown up, with the loss of near 100 men killed and wounded. Fortunately for the garrison, however, two flank-works still remained entire, from both which a heavy fire was kept up, that though an assault was immediately given, the assailants were repulsed with great slaughter. This afforded leisure to the garrison to carry off the wounded men, with some of the artillery, and to spike up the rest. As the enemy, however, soon recovered themselves, and prepared for a general storm, it was thought proper to abandon the flank-works, and retire into the body of the place. The position of these outworks, however, gave the enemy such a vantage, that the place was no longer tenable. Their situation, on a rising ground, enabled them to command the battery of mortars to their chief approach with small arms, and to finish off the men at their guns. A capitulation therefore became absolutely necessary, which was obtained on honourable terms. The town, with the whole province of West Florida, was continued to the Spaniards by the treaty of 1783. W. Long. 87. 20. N. Lat. 30. 20.

PENSANCE, a town of Cornwall in England, at the bottom of Mountibay, about ten miles from the Land's End. It was burnt in 1595 by the Spaniards,

Perfies,
Pennsylvania.

who, with four galleys, surprized this part of the coast, and set fire to several villages and farms: but it was soon after rebuilt, made one of the coinage towns, and has now a considerable trade. It lies in the parish of Malvern, noted for its restorative spring, very effectual in the cure of lameness, as well as the cholic, &c. It is well built and populous, and has many ships belonging to it. The shore abounds so with lead, tin, and copper ore, that the veins thereof appear on the utmost extent of land at low-water mark.

PENSILFUS HORTI, *Hanging Gardens*, in antiquity. See BACYLUS, n^o 5.

PENNSILVANIA, late one of the principal British colonies in North America, had its name from the famous Quaker William Penn, son of Sir William, commander of the English fleet in Oliver Cromwell's time, and in the beginning of Ch. II.'s reign, who obtained a grant of it in the year 1679; is bounded on the east by Delaware bay and river, and the Atlantic ocean; on the north by the country of the Iroquois, or five nations; and on the south and west by Maryland. Its extent from north to south is about 200 miles; but its breadth varies greatly, from 15, and even less, to near 200.

The air in Pennsylvania is sweet and clear. The fall, or autumn, begins about the 20th of October, and lasts till the beginning of December, when the winter sets in, which continues till March, and is sometimes extremely cold and severe; but the air is then generally dry and healthy. The river Delaware, though very broad, is often frozen over. From March to June, that is, in the spring, the weather is more inconstant than in the other seasons. In the months of July, August, and September, the heats would be almost intolerable, if they were not mitigated by frequent cool breezes. The wind during the summer is generally south-west; but in the winter blows for the most part from the north-west, over the snowy frozen mountains and lakes of Canada, which occasions the excessive cold during that season. On the whole, the climate of this state differs not materially from that of Connecticut, except that on the west side of the mountains the weather is much more regular. The inhabitants never feel those quick transitions from cold to heat, by a change of the wind from north to south, as those so frequently experience who live eastward of the mountains and near the sea. The hot southwardly winds get chilled by passing over the long chain of Allegany mountains.

Longevity, when tolerably ascertained, is doubtless the truest mark of the healthiness of any country; but this state, which has not been settled above 100 years, is not sufficiently old to determine from facts the state of longevity. Among the people called Quakers, who are the oldest settlers, there are instances of longevity, occasioned by their living in the old cultivated countries, and the temperance imposed on them by their religion. There are fewer long-lived people among the Germans than among other nations, occasioned by their excess of labour and low diet. They live chiefly upon vegetables and watery food, that affords too little nourishment to repair the waste of their strength by hard labour. Nearly one half of the children born in Philadelphia die under two years of age, and chiefly

with a disease in the stomach and bowels. Very few *Pennsylvanians* die at this age in the country.

As to the face of this country, towards the coast, like the adjacent colonies, it is flat, but rises gradually to the Apalachian mountains on the west. As much as nearly one third of this state may be called mountainous; particularly the counties of Bedford, Huntingdon, Cumberland, part of Franklin, Dauphin, and part of Bucks and Northampton, through which pass, under various names, the numerous ridges and spurs, which collectively form what we choose to call, for the sake of clearness, *the great range of Allegany mountains*. There is a remarkable difference between the country on the east and west side of the range of mountains we have just been describing. Between these mountains and the lower falls of the rivers which run into the Atlantic, not only in this, but in all the southern states, are several ranges of stones, sand, earths, and minerals, which lie in the utmost confusion. Beds of stone, of vast extent, particularly of limestone, have their several layers broken in pieces, and the fragments thrown confusedly in every direction. Between these lower falls and the ocean is a very extensive collection of sand, clay, mud, and shells, partly thrown up by the waves of the sea, partly brought down by floods from the upper country, and partly produced by the decay of vegetable substances. The country westward of the Allegany mountains, in these respects, is totally different. It is very irregular, broken, and variegated, but there are no mountains; and when viewed from the most western ridge of the Allegany, it appears to be a vast extended plain. All the various strata of stone appear to have lain undisturbed in the situation wherein they were first formed. The layers of clay, sand, and coal, are nearly horizontal. Scarcely a single instance is to be found to the contrary. Every appearance, in short, tends to confirm the opinion, that the original crust, in which the stone was formed, has never been broken up on the west side of the mountains, as it evidently has been eastward of them.

The chief rivers are three, Delaware, Susquehanna, and Skoolkil. The Delaware, rising in the country of the Iroquois, takes its course southward; and after dividing this province from that of New Jersey, falls into the Atlantic ocean between the promontories or capes May and Henlopen, forming at its mouth a large bay, called from the river *Delaware Bay*. This river is navigable above 200 miles. The Susquehanna rises also in the country of the Iroquois, and running south through the middle of the province, falls into the bay of Chesapeake, being navigable a great way for large ships. The Skoolkil has its source in the same country as the other two, and also runs south, almost parallel to them; till at length, turning to the eastward, it falls into the Delaware at the city of Philadelphia. It is navigable for boats above 100 miles. These rivers, with the numerous creeks and harbours in Delaware bay, capable of containing the largest fleets, are extremely favourable to the trade of this province.

As to the soil, produce, and traffic of Pennsylvania, we refer the reader to the articles NEW-YORK and the JERSEYS, since what is there said on those heads is equally applicable to this province; and if there is any difference, it is on the side of this province. They have

have some rice here, but in no great quantities; and some tobacco, but it is not equal to that of Virginia. From the premiums offered by the society of arts in London, it appears that the soil and climate of this province are looked upon as proper for the cultivation of some species of vines. The trade carried on from hence and the other colonies to the French and Dutch islands and Surinam, was greatly to the disadvantage of Britain, and very destructive to the sugar-colonies: for they take molasses, rum, and other spirits, with a great many European goods, from these foreigners; carrying then horses, provisions, and lumber in return; without which the French could not carry on their sugar-manufactures to that advantage they do.

New York, the Jerseys, and Pennsylvania, were discovered, with the rest of the continent of North America, in the reign of Henry VII. by Sebastian Cabot, for the crown of England; but Sir Walter Raleigh was the first adventurer that attempted to plant colonies on these shores, in the reign of Queen Elizabeth; and, in honour of that princess, gave all the eastern coast of North America the name of *Virginia*. Mr Hudson, an Englishman, sailing to that part of the coast which lies between Virginia and New England, in the beginning of the reign of James I. and being about to make a settlement at the mouth of Hudson's river, the Dutch gave him a sum of money to dispose of his interest in this country to them. In the year 1608 they began to plant it; and, by virtue of this purchase, laid claim to all those countries which are now denominated *New York*, *New Jersey*, and *Pennsylvania*; but there remaining some part of this coast which was not planted by the Hollanders, the Swedes sent a fleet of ships thither, and took possession of it for that crown; but the Dutch having a superior force in the neighbourhood, compelled the Swedes to submit to their dominion, allowing them, however, to enjoy the plantations they had settled. The English not admitting that either the Dutch or Swedes had any right to countries first discovered and planted by a subject of England, and part of them at that time possessed by the subjects of Great Britain, under charter from Queen Elizabeth and King James I. King Charles II. during the first Dutch war in 1664, granted the countries of New York, the Jerseys, and Pennsylvania, of which the Dutch had usurped the possession, to his brother James Duke of York; and Sir Robert Carr being sent over with a squadron of men of war and land forces, and summoning the Dutch governor of the city of New Amsterdam, now New York, to surrender, he thought fit to obey the summons, and yield that capital to the English: the rest of the places in the possession of the Dutch and Swedes followed his example; and these countries were confirmed to the English by the Dutch at the next treaty of peace between the two nations. The Duke of York afterwards parcelled them out to under proprietors; assigning, in particular, to William Penn the elder, in 1682, the town of Newcastle, *alias* Delaware, and a district of 12 miles round the same; to whom, his heirs and assigns, by another deed of the same date, his uncle over all that tract of land from 12 miles south of Newcastle to the Where hills, otherwise called *Cape Henlopen*, now divided into the two counties of Kent and Sussex, which with Newcastle district, are com-

monly known by the name of the *Three Lower Counties upon Delaware River*. All the rest of the under-proprietors, some time after, surrendered their charters to the crown; whereby New York and the Jerseys became royal governments; but Penn retained that part of the country which had been sold to him by the Duke of York, together with what had been granted to him before in 1680-1, which now constitutes the province of Pennsylvania. As soon as Penn had got his patent, he began to plant the country. Those who went over from England were generally Dissenters and Quakers, whose religion is established by law here, but with a toleration of all other Protestant sects. The Dutch and Swedes, who were settled here before Mr Penn became proprietor, choosing still to reside in this country, as they did in New York and the Jerseys, obtained the same privileges as the rest of his majesty's subjects; and their descendants are now in a manner the same people with the English, speaking their language, and being governed by their laws and customs. Mr Penn, however, not satisfied with the title granted him by King Charles II. and his brother, bought the lands also of the Indians for a valuable consideration, or what they esteemed such (though 20 miles were purchased, at first, for less than an acre about Philadelphia would pay now), paying them in cloth, tools, and utensils, to their entire satisfaction; for they had not hands to cultivate the hundredth part of their lands, and if they could have raised a product, there was nobody to buy: the purchase, therefore, was all clear gain to them; and, by the coming of the English, their paltry trade became so profitable, that they soon found their condition much altered for the better; and are now as well clothed and fed as the European peasantry in many places.

Pennsylvania is one of the most flourishing colonies in North America, having never had any quarrel with the natives. Whenever they desire to extend their settlements, they purchase new lands of the Indians, never taking any by force; but the Indians now set a very high price upon their lands, in comparison of what they did at first, and will not sell part with them at any rate. In an estimate of the proprietary estate of the province, published above 4 years ago, we find, that the proprietaries, who alone can purchase lands here from the natives, had bought seven millions of acres for no more than 750,000*l.*, when the proprietaries afterwards sold at the rate of 15*l.* for every 100 acres. The Indian council at Onondago, however, disapproved of their selling parting with so much land; and, in the year 1727, told of the proprietaries to recover great part of the lands of the Indians.

A dispute followed a long time between the proprietaries of this province and Lord Baltimore, Proprietary of Maryland, about the right of fishing; which was at last amicably settled, to the great satisfaction in favour of the Penns.

About the year 1704 there happened a great variation in the constitution of the province, by the establishment that took place, and first of the assembly, which was broken off, and then of a new assembly, and assembly, each with much the same powers and privileges as in the neighbouring colony of New York. The presentment government and council were then

Pennsylvania by the proprietors Thomas and Richard Penn, with his majesty's approbation; but if the laws enacted here were not repealed within six months after they had been presented to the king for his approbation or disallowance, they were not repealable by the crown after that time.

By the present constitution of Pennsylvania, which was established in September 1776, all legislative powers are lodged in a single body of men, which is styled, *The general assembly of representatives of the freemen of Pennsylvania*. The qualification required to render a person eligible to the assembly is, two years residence in the city or county for which he is chosen. The qualifications of the elector are, full age, and one year's residence in the state, with payment of public taxes during that time. But the sons of freeholders are entitled to vote for representatives, without any qualification except full age. No man can be elected as a member of the assembly more than four years in seven. The representatives are chosen annually on the second Tuesday in October, and they meet on the fourth Monday of the same month. The supreme executive power is lodged in a president, and a council consisting of a member from each county. The president is elected annually by the joint ballot of the assembly and council, and from the members of council. A vice-president is chosen at the same time. The counsellors are chosen by the freemen every third year; and having served three years, they are ineligible for the four succeeding years. The appointments of one third only of the members expire every year; by which rotation no more than one third can be new members.

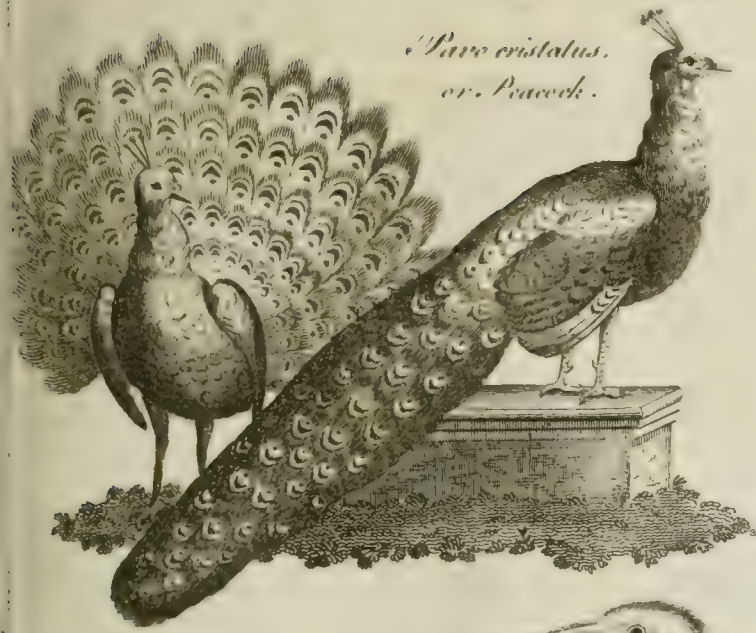
With respect to population, Morse informs us, that in 1787 the inhabitants in Pennsylvania were reckoned at 360,000. It is probable they are now more numerous, perhaps 400,000. If we fix them at this, the population for every square mile will be only nine; by which it appears that Pennsylvania is only one fifth as populous as Connecticut. But Connecticut was settled nearly half a century before Pennsylvania; so that in order to do justice to Pennsylvania in the comparison, we must anticipate her probable population 50 years hence. These inhabitants consist of emigrants from England, Ireland, Germany, and Scotland. The Friends and Episcopalians are chiefly of English extraction, and compose about one third of the inhabitants. They live principally in the city of Philadelphia, and in the counties of Chester, Philadelphia, Bucks, and Montgomery. The Irish are mostly Presbyterians. Their ancestors came from the north of Ireland, which was originally settled from Scotland; hence they have sometimes been called Scotch Irish, to denote their double descent. But they are commonly and more properly called Irish, or the descendants of people from the north of Ireland. They inhabit the western and frontier counties, and are numerous. The Germans compose one quarter at least, if not a third, of the inhabitants of Pennsylvania. They inhabit the north parts of the city of Philadelphia, and the counties of Philadelphia, Montgomery, Bucks, Dauphin, Lancaster, York, and Northampton; mostly in the four last. They consist of Lutherans (who are the most numerous sect), Calvinists, Moravians, Mennonists, Tunkers (correctly called Dunkers), and Swing-

felters, who are a species of Quakers. These are all distinguished for their temperance, industry, and economy. The Germans have usually 13 of 60 members in the assembly: and some of them have arisen to the first honours in the state, and now fill a number of the higher offices. Yet the lower class are very ignorant and superstitious. It is not uncommon to see them going to market with a large bag of salt tied to their hither shoulders, for the purpose, they say, of keeping off the witches.

The Baptists (except the Mennonist and Tunker Baptists, who are Germans) are chiefly the descendants of emigrants from Wales, and are not numerous. A proportionate semblance of the national prejudices, the manners, customs, religions, and political sentiments of all these, will soon be the Pennsylvania character. As the leading traits in this character, thus constituted, we may venture to mention industry, frugality bordering in some instances on parsimony, enterprise, a taste and ability for improvements in mechanics, in manufactures, in agriculture, in commerce, and in the liberal sciences; temperance, plainness, and simplicity in dress and manners; pride and humility in their extremes; inoffensiveness and intrigue; in regard to religion, variety and harmony; liberality, and its opposites, superstition and bigotry; and in politics an unhappy jargon. Such appear to be the distinguishing traits in the collective Pennsylvanian character.

Of the great variety of religious denominations in Pennsylvania, the Friends or Quakers are the most numerous. They were the first settlers of Pennsylvania in 1682 under William Penn, and have ever since flourished in the free enjoyment of their religion. They neither give titles nor use compliments in their conversation or writings, believing that *whatsoever is more than yea, yea, and nay, nay, cometh of evil*. They conscientiously avoid, as unlawful, kneeling, bowing, or uncovering the head to any person. They discard all superfluities in dress or equipage; all games, sports, and plays, as unbecoming the Christian. *Swear not at all*, is an article of their creed literally observed in its utmost extent. They believe it unlawful to fight in any case whatever; and think that if their enemy *smite thee on the one cheek, they ought to turn to him the other also*. They are generally honest, punctual, and even punctilious in their dealings; provident for the necessities of their poor; friends to humanity, and of course enemies to slavery; strict in their discipline; careful in the observance even of the punctilios in dress, speech, and manners, which their religion enjoins; faithful in the education of their children; industrious in their several occupations. In short, whatever peculiarities and mistakes those of other denominations have supposed they have fallen into, in point of religious doctrines, they have proved themselves to be good citizens. Next to the Quakers, the Presbyterians are the most numerous. There are upwards of 60 ministers of the Lutheran and Calvinist religion, who are of German extraction, now in this state; all of whom have one or more congregations under their care; and many of them preach in splendid and expensive churches; and yet the first Lutheran minister, who arrived in Pennsylvania about 40 years ago, was alive in 1787, and probably is still, as was also the second Calvinistical minister.

Pavo cristatus.
or, Peacock.



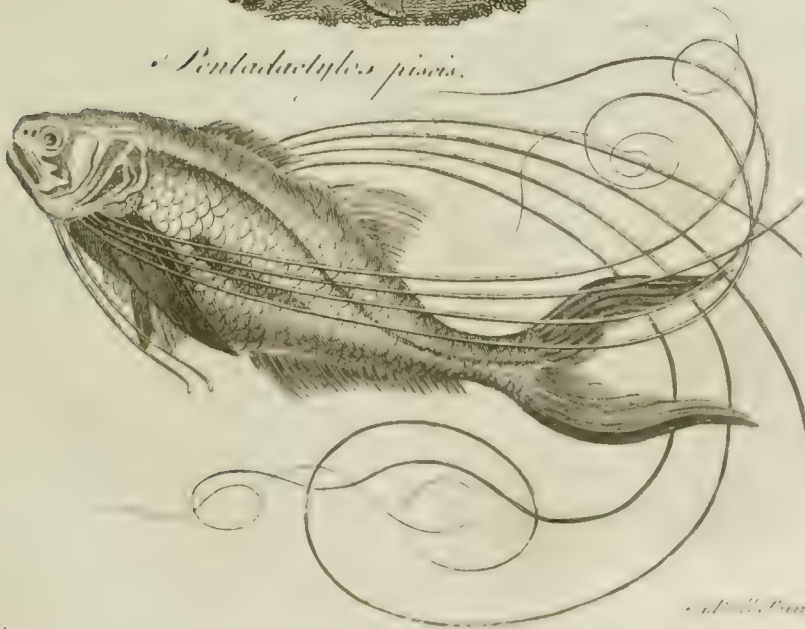
Puclopia.
or horned pheasant.



Pelecanus.



Pseudactis piscis.



minister. The Lutherans do not differ in any thing essential from the Episcopalians, nor do the Calvinists from the Presbyterians.

The Moravians are of German extraction. Of this religion there are about 1320 souls in Pennsylvania, viz. between 500 and 600 in Bethlehem, 450 in Nazareth, and upwards of 300 at Litiz in Lancaster county. They call themselves the *United Brethren of the Protestant Episcopal church*. They are called *Moravians*, because the first settlers in the English dominions were chiefly migrants from Moravia. See HERNHUTTERS, and *UNITAS Fratrum*; and for the Menonites, see MENONITES. They were introduced into America by Count Zinzendorf, and settled at Bethlehem, which is their principal settlement in America, as early as 1741. For the Tunkers, see TUNKERS.

There are a great many literary, humane, and other useful societies in Pennsylvania; more, it is said, than in any of the United Provinces. There are several universities and colleges at Philadelphia and other places: See PHILADELPHIA. Lancaster, Carlisle, and Pittsburgh, are the chief towns after Philadelphia.

Pennsylvania is divided into seven counties; four of which are called the *Upper* and three the *Lower*. Of the upper, viz. Buckingham, Philadelphia, Chester, and Lancaster, the three first are the lands included in King Charles II.'s grant, and designed *Pennsylvania*; the lower, viz. those of Newcastle, Kent, and Sussex, were called *New Belgia* before the duke of York sold them, as we observed above, to Mr Penn. The upper counties end at Marcus Hook, four miles below Chester town, where the lower begin, and run along the coast near 100 miles. Each of these counties had a sheriff, with a quarterly and monthly session, and assizes twice a year.

In the Philosophical Transactions for 1757, there is an account of a copper spring in Pennsylvania. This spring rises from a copper mine, and will dissolve iron in less time by three-fourths than the waters of Wicklow in Ireland, lately described by Dr William Henry and Dr Bond. From the solution of iron in these waters, about half the quantity of pure copper is procured by melting it in a crucible: but though these waters melt iron sooner than the Irish waters, yet the solution does not produce so great a proportion of copper; for the pure copper procured from the solution of iron in the Irish waters is to the solution as 16 to 20. In the neighbourhood of this spring, which supplies 800 hhd. in 24 hours, are many ores of vitriol and sulphur; the water is of a pale green colour, of an acid, sweet, astringent, ink, and nauseous taste. It is very heavy; for the hydrometer, which was immersed in it, stood at the same height as in a solution of one ounce six drams of English vitriol in a quart of water. A very small quantity of the solution of pot ashes instantly precipitates the metallic parts of this water in three different colours; ochre at the top, green in the middle, and white at bottom; a clean knife kept in it a few minutes, is covered with a bright copper colour. But besides a large proportion of copper, this water contains also a large proportion of vitriol of iron. A pint of it exhaled by a slow fire left 400 grains of solid contents, which appeared to be chiefly saline; for 196 grains of it, dissolved and filtered, did not leave above

four grains of indissoluble matter. It appears therefore, that the proportion of vitriolic parts in this water is six drams to a pint; consequently it is a stronger solution of vitriol than sea-water is of marine salt. So that, besides the copper to be obtained by a solution of iron, it will afford great quantities of vitriol, and the great plenty both of water and fuel will make the establishment of a copper work extremely cheap and commodious. This water mixed with common water is frequently used as an emetic and cathartic by the country people, and is found very efficacious in the cure of cutaneous disorders and sore eyes.

Amongst the other curiosities of this province may be reckoned another spring about 14 feet deep and about 100 square, in the neighbourhood of Reading. A full mill stream issues from it. The waters are clear and full of fishes. From appearances it is probable that this spring is the opening or outlet of a very considerable river, which a mile and an half or two miles above this place sinks into the earth, and is conveyed to this outlet in a subterranean channel. In the northern parts of Pennsylvania there is a creek called *Oil creek*, which empties into the Alleghany river. It issues from a spring, on the top of which floats an oil similar to that called *Barbadoes tar*, and from which one man may gather several gallons in a day. The troops sent to guard the western posts halted at this spring, collected some of the oil, and bathed their joints with it. This gave them great relief from the rheumatic complaints with which they were affected. The waters, of which the troops drank freely, operated as a gentle purge.

There are three remarkable grottoes or caves in this state: one near Carlisle, in Cumberland county; one in the township of Durham, in Buck's county; and the other at Swetara, in Lancaster county. Of the two former there are no particular descriptions. The latter is on the east bank of Swetara river, about two miles above its confluence with the *Sutquehanna*. Its entrance is spacious, and descends so much as that the surface of the river is rather higher than the bottom of the cave. The vault of this cave is of solid limestone rock, perhaps 20 feet thick. It contains several apartments, some of them very high and spacious. The water is incessantly percolating through the roof, and falls in drops to the bottom of the cave. These drops petrify as they fall, and have gradually formed solid pillars, which appear as supports to the roof. Thirty years ago there were ten such pillars, each six inches in diameter, and six feet high; all so ranged that the place they inclosed resembled a sanctuary in a Roman church. No royal throne ever exhibited more grandeur than this *lapis nature*. The resemblances of several monuments are found indented in the walls on the sides of the cave, which appear like the tombs of departed heroes. Suspended from the roof is the *bell* (which is nothing more than a stone projected in an unusual form), so called from the sound that it occasions when struck, which is similar to that of a bell. Some of the stalactites are of a colour like sugarcandy, and others resemble loaf sugar; but their beauty is much defaced by the country people. The water, which percolates through the roof, so much of it as is not petrified in its course, runs down the declivity,

Pension

Pensioner

and is both pleasant and wholesome to drink. There are several holes in the bottom of the cave, descending perpendicularly, perhaps into an abyss below, which renders it dangerous to walk without a light. At the end of the cave is a pretty brook, which, after a short course, loses itself among the rocks. Beyond this brook is an outlet from the cave by a very narrow aperture. Through this the vapours continually pass outwards with a strong current of air, and ascend, resembling at night the smoke of a furnace. Part of these vapours and fogs appear on ascending to be condensed at the head of this great alembic, and the more volatile parts to be carried off, through the aperture communicating with the exterior air before mentioned, by the force of the air in its passage.

PENSION, a sum of money paid annually for services or considerations already paid. The yearly payment of each member to the houses of the inns of courts are likewise named *pensions*; and the yearly assembly of the society of Gray's Inn, to consult on the affairs of the house, is also called a *pension*.

PENSIONARY, or **PENSIONER**, a person who has an appointment or yearly sum, payable during life, by way of acknowledgment, chartered on the estate of a prince, company, or particular person.

Grand Pensionary, an appellation given to the first minister of the States of Holland. The grand pensionary is chairman in the assemblies of the states of that province: he proposes the matters to be consulted on; collects the votes; forms and pronounces the resolutions of the states; opens letters; confers with foreign ministers, &c. His business is also to inspect the finances, to maintain the authority of the states, and to see that the laws are observed; and he is perpetual deputy of the states general of the United Provinces. His commission is, however, given him only for five years; after which it is dedicated whether or not it shall be renewed; but there is no instance of its being revoked; therefore death only puts an end to the functions of this important minister.

PENSIONARY, is also the first minister of the revenue of each city in Holland. His office is to give his advice in affairs relating to the government, either of the state in general, or of the city in particular; and in assemblies of the states of the province, he is speaker in behalf of his city. The function, however, of these pensionaries is not everywhere alike; in some cities they only give their advice, and are never found in assemblies of the magistrates, except when expressly called thither; in others they attend constantly; and in others they make the propositions on the part of the burgomasters, draw up their conclusions, &c. They are called *pensionaries*, because they receive an appointment or pension.

PENSIONER, in general, denotes a person who receives a pension, yearly salary, or allowance. Hence *The Band of Gentlemen Pensioners*, the noblest sort of guard to the king's person, consists of 40 gentlemen, who receive a yearly pension of 100 l.

This honourable band was first instituted by King Henry VIII. and their office is to attend the king's person, with their battle-axes, to and from his chapel-chamber, and to receive him in the presence-chamber, or dining-room or his privy-lodgings; they are also to attend at all great feasts, at coronations, St. George's

feast, public audiences of ambassadors, at the sovereign's going to parliament, &c.

They are each obliged to keep three double horses and a servant, and so are properly a troop of horse. They wait half at a time quarterly; but on Christmas-day, Easter-day, Whitsunday, &c. and on extraordinary occasions, they are all obliged to give their attendance. They have likewise the honour to carry up the sovereign's dinner on the coronation-day and St. George's feast; at which times the king or queen usually confer the honour of knighthood on two such gentlemen of the band as their captain presents.

Their arms are gilt battle-axes; and their weapons, on horseback, in time of war, are cuirassiers' arms, with sword and pistols. Their standard in time of war is, argent, a cross gules. Their captain is always a nobleman, who has under him a lieutenant, a standard-bearer, a clerk of the check, secretary, paymaster, and harbinger.

PENSIONER, in the university of Cambridge and in that of Dublin, has a very peculiar meaning; for those students, either under-graduates or bachelors of arts, are called *pensioners* who live wholly at their own expence, and who receive no emolument whatever from the college of which they are members. They are divided into two kinds, the *greater* and the *less*; the former of which are generally called *scholar-communiars*, because they eat with the fellows of their college; the latter are always called *pensioners*, and eat with the scholars, who are those students of the college, either under-graduates or bachelors who are upon the foundation, who receive emoluments from the society, and who are capable of being elected fellows. See **SERVITOR** and **SIZAR**.

PENSTOCK, a sluice or flood-gate, serving to retain or let go at pleasure the water of a mill pond, or the like.

PENTACEROS, in natural history, a name given by Linkius and some other authors to a kind of *stella marina* or sea star fish, composed of five principal rays, with several transverse hairy or downy processes.

PENTACHORD (compounded of *πεντε* five, and *χορδή* string), an ancient musical instrument with five strings. The invention of the pentachord is referred to the Sythians; the strings were of bullock's leather, and they were struck with a plectrum made of goats horn.

PENTACROSTIC, in poetry, a set of verses so disposed, as that there are always five acrostics of the same name, in five divisions of each verse. See **ACROSTIC**.

PENTACTINODOS, in natural history, a name given by some authors to those species of star-fish which are composed of a body divided into five rays.

PENTADACTYLON, FIVE FINGERS, in botany, a name given by some authors to the *riemus* or *palma Christi*, from the figure of its leaf.

PENTADACTYLOS PISCIS, the five fingered fish, in ichthyology, the name of a fish common on all the seas about the East India, and called by the Dutch *the vijfvinger vis*.

It has this name from five black streaks which it has on each side, extending to the points of five fingers. Its head is flat, covered with scales, plain the sides, and inclined in the back. The snout is thick, obtuse, and round; the lower jaw at its extremity bent and

Pensi

Pentad

tylos

Plate

cccxxx

and rounded; the nostrils are double; the balls of the eyes oval; the iris of a silver colour; the first fin of the back is small, the second is more elevated; those of the breast are inserted obliquely, that of the anus is greatly extended, and that of the tail much sloped. The whole body is covered with scales of a moderate size, thin, flexible, and slightly indented on their hinder edge; the back is reddish, the sides of a silver colour, and the fins white. The fish is described by some as about nine inches long; by others as a foot and a half. It is a dry but not ill-tasted fish.

PENTÆDROSTYLA, in natural history, the name of a genus of spars: (See SPAR). The bodies of this genus are spars in form of pentagonal columns, terminated by pentangular pyramids at one end, and regularly affixed at the other to some solid body.

PENTAGON, in geometry, a figure of five sides and five angles. See GEOMETRY.

In fortification, pentagon denotes a fort with five bastions.

PENTAGONOTHECA, in botany, the name given by Vaillant to the plant called by Linnæus, Plumier, Houston, and others, *pisonia*.

PENTAGRAPH, an instrument designed for drawing figures in what proportion you please, without any skill in the art.

The instrument is otherwise called a *parallelogram*. The common pentagraph (Plate CCCLXXXIII. fig. 14.) consists of four brass or wooden rulers, two of them from 15 to 18 inches long, the other two half that length. At the ends, and in the middle, of the longer rulers, as also at the ends of the shorter, are holes, upon the exact fixing whereof the perfection of the instrument chiefly depends. Those in the middle of the long rulers are to be at the same distance from those at the end of the long ones and those of the short ones; so that when put together they may always make a parallelogram.

The instrument is fitted together for use by several little pieces, particularly a little pillar, N^o 1. having at one end a screw and nut, whereby the two long rulers are joined; and at the other a little knot for the instrument to slide on. The piece, N^o 2. is a rivet with a screw and nut, wherewith each short ruler is fastened to the middle of each long one. The piece, N^o 3. is a pillar, one end whereof, being hollowed into a screw, has a nut fitted to it. At the other end is a worm to screw into the table; when the instrument is to be used, it joins the ends of the two short rulers. The piece, N^o 4. is a pen, portcrayon, or pencil, screwed into a little pillar. Lastly, the piece, N^o 5. is a brass point, moderately blunt, screwed likewise into a little pillar.

Use of the PENTAGRAPH, or Parallelogram. 1. To copy a design in the same scale or bigness as the original: screw the worm N^o 3. into the table; lay a paper under the pencil N^o 4. and the design under the point N^o 5. This done, conducting the point over the several lines and parts of the design, the pencil will draw or repeat the same on the paper.

2. If the design be to be reduced—*e. gr.* into half the space, the worm must be placed at the end of the long ruler, N^o 4. and the paper and pencil in the middle. In this situation conduct the brass point over the several lines of the design, as before; and the pen-

cil at the same time will draw its copy in the proportion required; the pencil here only moving half the lengths that the point moves.

Hence, on the contrary, if the design be to be enlarged by one half, the brass point, with the design, must be placed in the middle, at N^o 3. the pencil and paper at the end of the long ruler, and the worm at the other.

3. To enlarge or reduce in other proportions, there are holes drilled at equal distances on each ruler, viz. all along the short ones, and half way of the long ones, in order for placing the brass point, pencil, and worm, in a right line therein; *i. e.* if the piece carrying the point be put in the third hole, the two other pieces must be put in its third hole.

If, then, the point and design be placed at any hole of the great rulers, and the pencil with the paper at any hole of the short ruler, which forms the angle therewith, the copy will be less than half the original. On the contrary, if it be placed at one of the holes of that short ruler, which is parallel to the long ruler, the copy will be greater than half the original.

The construction of this instrument requires a degree of accuracy which most of our instrument-makers are strangers to; for which reason there are very few of the instruments that succeed. Few will do any thing tolerably but straight lines; and many of them not even those.

In order to prove that the figure described by a pentagraph is similar to the given figure, let C (fig. 15.) be the fixed centre of motion; P the pencil for tracing the given figure PP, and p the pencil which traces the other figure pp; p, &c. must be so adjusted, that p, C, and P, may lie in one straight line; then, since Bp : Ap :: BP : AC, whatever be the situation of the pentagraph, the angles PCP and pCp are vertical; and therefore PCp will in every position of the instrument be a right line: but PC : pC :: BA : Ap, in each of the two positions in the figure, and consequently the triangles PCP, pCp, are similar; and PP : pp :: PC : pC :: BA : Ap, or in a given ratio. Hence it appears, that, by moving the pencil p, Ap may be equal to BA, or less in any proportion; and consequently pp may be equal to PP, or less, in the same proportion.

PENTAMETER, in ancient poetry, a kind of verse, consisting of five feet, or metres, whence the name. The two first feet may be either dactyls or spondees at pleasure; the third is always a spondee; and the two last anapestes: such is the following verse of Ovid.

1 2 3 4 5
Carminibus vivas tempus in omne iuris.

A pentameter verse subjoined to an hexameter, constitutes what is called *elegiac*. See ELEGIAC.

PENTANDRIA (from *πέντε* five, and *άνδρ* a man or husband); the name of the fifth class in Linnæus's sexual method, consisting of plants which have hermaphrodite flowers, with five stamina or male organs. See BOTANY, p. 430.

PENTAPETALOUS, an appellation given to flowers which consist of five petals or leaves.

PENTAPETES, in botany: A genus of the decandria order, belonging to the monodelphia class of plants; and in the natural method ranking under the

Penta-
graph
||
Pentapetes.

Pentapolis
Pentateuch.

37th order, *Colum fera*. The calyx is quinquepartite; the stamens are 35 in number, of which five are castrate and long; the capsule quinquelocular and polyspermous. There is but one species known in the gardens of this country, viz. the phœnicia, with halbert-pointed, spear-shaped, sawed leaves. It is an annual plant, a native of India, and rises to the height of two or three feet, adorned with fine scarlet flowers, consisting of one petal cut into five segments. In the centre of the flower arises a short thick column, to which adhere 15 short stamens. It is a tender plant, and must be brought up in the hot-house.

PENTAPOLIS. This name is given to the five cities, Sodom, Gomorrah, Admah, Zeboim, and Zoar (Wilem. 8. 20). They were all five condemned to utter destruction, but last interdicted for the preservation of Zoar, otherwise called *Bela*. Sodom, Gomorrah, Admah, and Zeboim, were all consumed by fire from heaven, and in the place where they stood was made the lake Asphaltites, or the lake of Sodom.

PENTAPOLIS (Ptolemy), a district of Cyrenaica; situated on the Mediterranean; denominated from its five cities; namely, Berenice, Arsinoe, Ptolemais, Cyrene, and Apollonia.

PENTAPOLIS of the *Philistines* (Josephus); taking name from five principal cities, Gaza, Gath, Ascalon, Azotus, and Ekron.

PENTATEUCH. This word, which is derived from the Greek Πεντάτευχος, from *πέντε*, five, and *τευχος*, an instrument or volume, signifies the collection of the five instruments or books of Moses, which are Genesis, Exodus, Leviticus, Numbers, and Deuteronomy: each of which books we have given an account of under their several names.

There are some modern critics who have disputed Moses's right to the pentateuch. They observe that the author speaks always in the third person. "Now the man Moses was very meek above all the men which were upon the face of the earth. The Lord spake unto Moses, saying, &c." Moses said to Pharaoh, &c." Thus they think he would never have spoken of himself; but would at least sometimes have mentioned himself in the first person. Besides this, say they, the author of the pentateuch sometimes abridges his narration like a writer who collected from some ancient memoirs. Sometimes he interrupts the thread of his discourse; for example, he makes Lamech the bigamist to say (Gen. iv. 23.), "Hear my voice, ye wives of Lamech, hearken unto my speech; for I have slain a man to my wounding, and a young man to my hurt," without informing us beforehand to whom this is related. These observations, for example (Gen. xii. 6.), "And the Canaanite was then in the land," cannot be reconciled to the age of Moses, since the Canaanites continued to be the masters of Palestine all the time of Moses. The passage out of the book of the wars of the Lord, quoted in the book of Numbers (xxi. 14.), seems to have been clipped in afterwards, as also the first verses of Deuteronomy. The account of the death of Moses, which is at the end of the same book, cannot certainly belong to this legislator; and the same judgment may be made of other passages, wherein it is said, that the places mentioned lay beyond Jordan; that the bed of Og was at Ramah to this day; that the havoth of Jair, or the cities of Jair, were known to

the author, though probably they had not that name till after Moses's time (Numb. xxxii. 41. Deut. iii. 14.)

It is observed also in the text of the pentateuch, that there are some places that are defective; for example, in Exodus (xii. 8.), we see Moses speaking to Pharaoh, where the author omits the beginning of his discourse. The Samaritan inserts in the same place what is wanting in the Hebrew. In other places, the same Samaritan copy adds what is deficient in the Hebrew text; and what it contains more than the Hebrew seems so well connected with the rest of the discourse, that it would be difficult to separate them. Lastly, they believe that they observe certain strokes in the pentateuch which can hardly agree with Moses, who was born and bred in Egypt; as what he says of the earthly paradise, of the rivers that watered it, and ran through it; of the cities of Babylon, Erech, Refen, and Calneh; of the gold of Pison, of the bdellium, of the stone of Sabeem, or onyx-stone, which was to be found in that country. These particulars, observed with such curiosity, seem to prove, that the author of the pentateuch lived beyond the Euphrates. Add what he says concerning the ark of Noah, of its construction, of the place where it rested, of the wood wherewith it was built, of the bitumen of Babylon, &c. But in answer to all these objections, we may observe in general, from an eminent writer* of our own country, that these books are by the most ancient writers ascribed to Moses; and it is confirmed by the authority of heathen writers themselves, that they are of his writing: besides this, we have the unanimous testimony of the whole Jewish nation, ever since Moses's time, from the first writing of them. Divers texts of the pentateuch imply that it was written by Moses, and the book of Joshua, and other parts of scripture, import as much; and though some passages have been thought to imply the contrary, yet this is but a late opinion, and has been sufficiently confuted by several learned men. The Samaritans receive no other scriptures but the pentateuch, rejecting all the other books which are still in the Jewish canon.

PENTATHLON, in antiquity, a general name for the five exercises performed at the Grecian games, viz. wrestling, boxing, leaping, running, and playing at the discus.

PENTECOST, a solemn festival of the Jews; so called, because it was celebrated on the 50th day after the 16th of Nisan, which was the second day of the passover. The Hebrews called it *the 50th of weeks*, because it was kept seven weeks after the passover. They then offered the first fruits of the wheat harvest, which was then completed: besides which they presented at the temple seven lambs of that year, one calf, and two rams, for a burnt offering; two lambs for a peace offering; and a goat for a sin offering (Levit. xxiii. 15, 16. Exod. xxxiv. 22. and Deut. xvi. 9, 10.) The feast of the pentecost was instituted among the Israelites, first to oblige them to repair to the temple of the Lord, there to acknowledge his absolute dominion over the whole country, and to offer him the first-fruits of their harvest; and, secondly, that they might call to mind, and give thanks to God, for the law which he had given them from mount Sinai, on the 50th day after their coming out of Egypt.

The

Fig. 1.



Fig. 5.

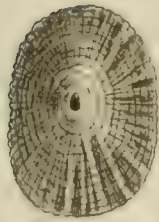


Fig. 8.



Fig. 9.

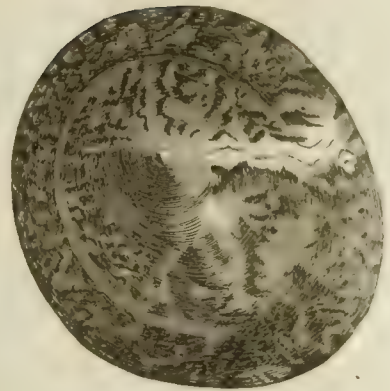


Fig. 2.

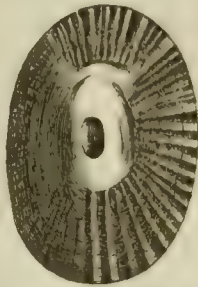


Fig. 7.



Fig. 4.



Fig. 6.

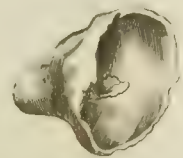


Fig. 3.



Fig. 11.

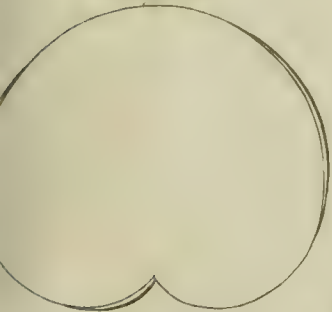


Fig. 12.

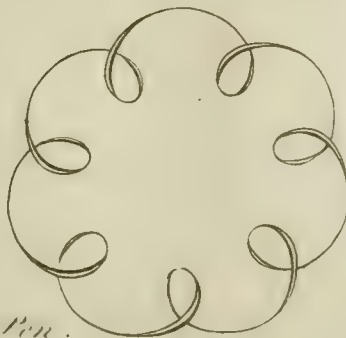


Fig. 13.

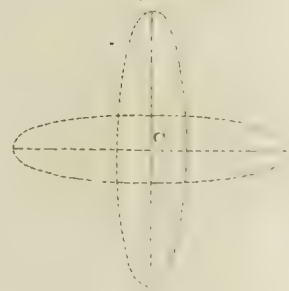
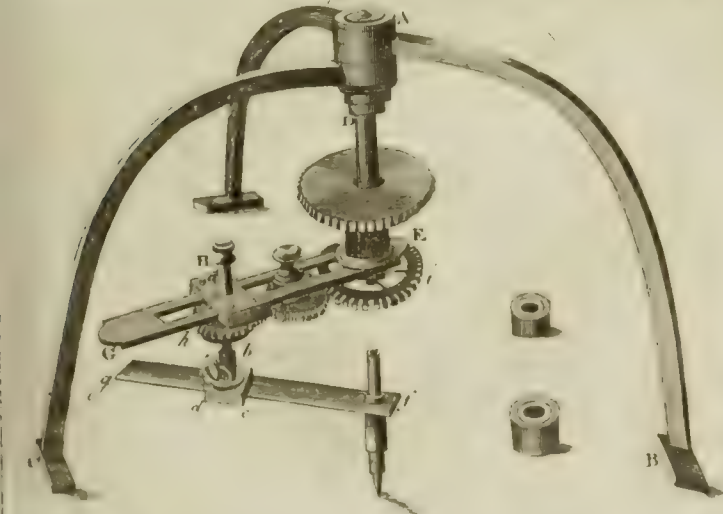
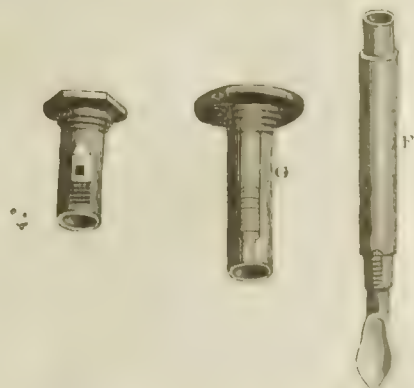


Fig. 10.
The Geometrical Pen.



The Fountain Pen.



elica The modern Jews celebrate the pentecost for two days. They deck the synagogues and their own houses with garlands of flowers. They have a sermon or oration in praise of the law, which they suppose to have been delivered on this day. The Jews of Germany make a very thick cake, consisting of honey and of paité, which they call *Sinat*. The seven layers represent the seven heavens, which they think God was obliged to descend from the top of this mountain. See *Leo of Modena at Buxtorf's synag. Jud.*

It was on the feast of pentecost that the Holy Ghost miraculously descended on the apostles of our Lord, who were assembled together after his ascension in a house at Jerusalem (Acts ii.)

PENTHESILEA, queen of the Amazons, succeeded Orythis, and gave proofs of her courage at the siege of Troy, where she was killed by Achilles. Pliny says that she invented the battle-axe.

PENTHORUM, in botany; a genus of the pentagynia order, belonging to the pentandria class of plants. The calyx is quinquefid; there are either five petals or none; the capsule is five-pointed and quincloocular.

PENTLAND or PICTLAND FRITH, is a narrow strait of six miles between the mainland of Scotland and the Orkney isles. This strait is the great thoroughfare of shipping between the eastern and western seas, the terror of the bolded mariners, and the grave of thousands; where the winter's storms afford many natives on the opposite shores a better livelihood than they could obtain by fishing or husbandry. They search from place to place, and from one cavern to another, in the hopes of finding timber, casks, and other floating articles of the wrecked vessels, of whom six or eight are thus sacrificed sometimes in one night. The navigation of this pass is rendered more dangerous by the island of Stromo, and two rocks called the *Skerries*, lying near the middle of it. See PICTLAND.

PENULA, among the ancient Romans, was a coarse garment or cloak worn in cold or rainy weather. It was shorter than the lacerna, and therefore more proper for travellers. It was generally brown, and succeeded the toga after the state became monarchical. Augustus abolished the custom of wearing the penula over the toga, considering it as too effeminate for Romans; and the *patres* had orders to suffer none to appear in the circus or forum with the lacerna or penula. Writers are not agreed as to the precise difference between these two articles of dress; but we are told that they were chiefly worn by the lower orders of people. See LACERNA.

PENULTIMA, or *PENULTIMATE Syllable*, in grammar, denotes the last syllable but one of a word; and hence the antepenultimate syllable is the last but two, or that immediately before the penultima.

PENUMBRA, in adonomy, a partial shade observed between the perfect shadow and the full light in an eclipse. It arises from the magnitude of the sun's body: for were he only a luminous point, the shadow would be all perfect; but, by reason of the diameter of the sun, it happens, that a place which is not illuminated by the whole body of the sun, does yet receive rays from a part thereof.

PEON, in the language of Hindostan, means a foot soldier, armed with sword and target. In common use

it is a footman, so armed, employed to run before a palanquin. *Piadab* is the proper word, from which *peon* is a corruption.

PEOR a famous mountain beyond Jordan, which Eusebius places between Heshbon and Livias. The mountains Nebo, Pisgah, and Peor, were near one another, and probably made but the same chain of mountains. It is very likely that Peor took its name from some deity of the same name, which was worshipped there; for Peor, Phegor, or Baal-peor, was known in this country. See Numb. xxv. 3. Deut. iv. 3. Psal. cv. 28.

PEOR, was a city of the tribe of Judah, which is not read in the Hebrew, nor in the Vulgate, but only in the Greek of the Septuagint (Josh. xv. 60.) Eusebius says it was near Bethlehem, and Jerom adds, that in his time it was called *Paora*.

PEPIN DE HERISTAL, or LE GROS, mayor of the palace under Clovis III. Childbert, and Dagobert. The power of these mayors in France was so great, that they left the sovereign only the empty title, and in the end seized on the throne itself.

Peux le Brif, or *le Pair*, grandson to Pepin le Gros, and first king of the second race of French monarchs, was mayor of the palace to Childeric III. a weak prince: he contrived to confine him and his son Thierris in different monasteries; and then, with the assistance of pope Stephen III. he usurped the sovereign power. He died in 768, aged 54.

PEPLIS, in botany: A genus of the monogynia order, belonging to the hexandria class of plants; and in the natural method ranking under the 17th order, *Calycanthemæ*. The perianthium is campanulate; the mouth cleft in 12 parts: there are six petals inserted into the calyx; the capsule is bilocular.

PEPLUS, a long robe worn by the women in ancient times, reaching down to the feet, without sleeves, and so very fine, that the shape of the body might be seen through it. The Athenians used much ceremony in making the peplus, and dressing the statue of Minerva with it. Homer makes frequent mention of the peplus of that goddess.

PEPPER, PIPER, in natural history, an aromatic berry of a hot dry quality, chiefly used in seasoning. We have three kinds of pepper at present used in the shops, the black, the white, and the long pepper.

Black pepper is the fruit of the piper, and is brought from the Dutch settlements in the East Indies. See PIPER.

The common white pepper is factitious, being prepared from the black in the following manner: they steep this in sea-water, exposed to the heat of the sun for several days, till the rind or outer bark loosens; they then take it out, and, when it is half dry, rub it till the rind falls off; then they dry the white fruit, and the remains of the rind blow away like chaff. A great deal of the heat of the pepper is taken off by this process, so that the white kind is more fit for many purposes than the black. However, there is a sort of native white pepper produced on a species of the same plant; which is much better than the factitious, and indeed little inferior to the black.

The long pepper is a dried fruit, of an inch or an inch and an half in length, and about the thickness of a large goose quill: it is of a brownish grey colour,

Pepper,
Pepper-
mint.

cylindrical in figure, and said to be produced on a plant of the same genus.

Pepper is principally used by us in food, to assist digestion: but the people in the East Indies esteem it as a stomachic, and drink a strong infusion of it in water by way of giving them an appetite: they have also a way of making a fiery spirit of fermented fresh pepper with water, which they use for the same purposes. They have also a way of preserving the common and long pepper in vinegar, and eating them afterwards at meals.

Jamaica PEPPER, or Pimento. See PIMENTO.

PEPPER-Mint. See MENTHA.

PEPPER-Pot. See CAPSICUM.

PEPPER-Water, a liquor prepared in the following manner, for microscopical observations: put common black pepper, grossly powdered, into an open vessel so as to cover the bottom of it half an inch thick, and put to it rain or river-water, till it covers it an inch; shake or stir the whole well together at the first mixing, but never disturb it afterwards: let the vessel be exposed to the air uncovered; and in a few days there will be seen a pellicle or thin skin swimming on the surface of the liquor, looking of several colours.

This is a congeries of multitudes of small animals; and being examined by the microscope, will be seen all in motion: the animals, at first sight, are so small as not to be distinguishable, unless to the greatest magnifiers; but they grow daily till they arrive at their full size. Their numbers are also continually increasing, till the whole surface of the liquor is full of them, to a considerable depth. When disturbed, they will sometimes all dart down to the bottom; but they soon after come up to the surface again. The skin appears soonest in warm weather, and the animals grow the quickest: but in the severest cold it will succeed, unless the water freezes.

About the quantity of a pin's head of this scum, taken up on the nib of a new pen, or the tip of a hair-pencil, is to be laid on a plate of clear glass; and if applied first to the third magnifier, then to the second, and finally to the first, will show the different animalcules it contains, of several kinds and shapes as well as sizes.

PEPPERMINT-TREE, in botany; the *Eucalyptus piperita*.

In a journal of a voyage to New South Wales, by John White, Esq; we have a plate of this tree, with the following account of it: "This tree grows to the height of more than 100 feet, and is above 30 feet in circumference. The bark is very smooth, like that of the poplar. The younger branches are long and slender, angulated near the top; but as they grow older, the angles disappear. Their bark is smooth, and of a reddish brown. The leaves are alternate, lanceolate, pointed, very entire, smooth on both sides, and remarkably unequal or oblique at their base; the veins alternate, and not very conspicuous. The whole surface of both sides of the leaves is marked with numerous minute resinous spots in which the essential oil resides. The footstalks are about half an inch in length, round on the under side, angular above, quite smooth. The flowers we have not seen. What Mr White has sent us the ripe capsules of this tree (although not attached to the specimens of the leaves) grow in clusters, from six to eight in each, sessile and

conglomerated. These clusters are supported on angular alternate footstalks, which form a kind of panicle. Each capsule is about the size of an hawthorn berry, globular, but as it were cut off at the top, rugged on the outside, hard and woody, and of a dark-brown colour. At the top is a large orifice, which shows the internal part of the capsule divided into four cells, and having a square column in the centre, from which the partitions of the cell arise. These partitions extend to the rim of the capsule, and terminate in four small projections, which look like the teeth of a calyx. The seeds are numerous, small, and angular.

"The name of *peppermint tree* has been given to this plant by Mr White, on account of the very great resemblance between the essential oil drawn from its leaves and that obtained from the peppermint (*mentha piperita*) which grows in England. This oil was found by Mr White to be much more efficacious in removing all cholicky complaints than that of the English peppermint, which he attributes to its being less pungent and more aromatic. A quart of the oil has been sent by him to Mr Willson.

"The tree above described appears to be undoubtedly of the same genus with that cultivated in some greenhouses in England, which Mr L'Heritier has described in his *Sertum Anglicum* by the name of *Eucalyptus obliqua*, though it is commonly called in the gardens *Mezefideros obliqua*; but we dare not assert it to be the same species, nor can this point be determined till the flowers and every part of both be seen and compared; we have compared the best specimens we could procure of each, and find no specific difference. The *eucalyptus obliqua* has, when dried, an aromatic flavour, somewhat similar to our plant. We have remarked, indeed, innumerable minute white spots, besides the resinous ones, on both surfaces of the leaves in some specimens of the garden plant, which are not to be seen in ours; and the branches of the former are rough, with small scaly tubercles. But how far these are constant, we cannot tell. The obliquity in the leaves, one side being shorter at the base than the other, as well as somewhat narrower all the way up, as in the *Begonia nitida* of the *Hortus Kewensis*, is remarkable in both plants.

"The figure represents a branch of the peppermint tree in leaf: on one side of it part of a leaf separate, bearing the gall of some insect; on the other the fruit above described."

PERA, one of the suburbs of Constantinople, where ambassadors and Christians usually reside. See CONSTANTINOPLE.

PERAMBULATOR, in surveying, an instrument for measuring distances, called also *pedometer*, *way-wiser*, and *surveying-wheel*. See PEDOMETER.

It consists of a wheel AA, two feet seven inches and a half in diameter; consequently half a pole, or eight feet three inches, in circumference. On one end of the axis is a nut, three quarters of an inch in diameter, and divided into eight teeth; which, upon moving the wheel round, fall into the eight teeth of another nut c, fixed on one end of an iron-rod Q, and thus turn the rod once round in the time the wheel makes one revolution. This rod, lying along a groove in the side of the carriage of the instrument, under the dotted line, has at its other end a square end into which is fitted the end b of a small cylinder P. This cylinder

Plate
CCCLXXXVII

Plate
CCCLXXXVII

Abul. cylinder is disposed under the dial-plate of a movement, at the end of the carriage B, in such a manner as to be moveable about its axis: its end *a* is cut into a perpetual screw, which falling into the 32 teeth of a wheel perpendicular thereto, upon driving the instrument forward, that wheel makes a revolution each 16th pole. On the axis of this wheel is a pinion with six teeth, which, falling into the teeth of another wheel of 60 teeth, carries it round every 160th pole, or half a mile.

This last wheel, carrying a hand or index round with it over the divisions of a dial-plate, whose outer limb is divided into 160 parts, corresponding to the 160 poles, points out the number of poles passed over. Again, on the axis of this last wheel is a pinion, containing 20 teeth, which falling into the teeth of a third wheel which hath 40 teeth, drives it once round in 320 poles, or a mile. On the axis of this wheel is a pinion of 12 teeth, which, falling into the teeth of a fourth wheel having 72 teeth, drives it once round in 12 miles.

This fourth wheel, carrying another index over the inner limb of the dial-plate, divided into 12 for miles, and each mile subdivided into halves, quarters, and furlongs, serves to register the revolutions of the other hand, and to keep account of the half miles and miles passed over as far as 12 miles.

The use of this instrument is obvious from its construction. Its proper office is in the surveying of roads and large distances, where a great deal of expedition, and not much accuracy, is required. It is evident, that driving it along and observing the hands, has the same effect as dragging the chain and taking account of the chains and links.

Its advantages are its hardness and expedition; its contrivance is such, that it may be fitted to the wheel of a coach, in which state it performs its office, and measures the road without any trouble at all.

PERCA, the PERCH; a genus of fishes belonging to the order of thoracici. The head is furnished with scaly and serrated opercula; there are seven rays in the membrane of the gills; and the fins on the back are prickly. There are 38 species, principally distinguished by peculiarities in the back fin. The most remarkable are,

1. The *fluviatilis*, or common perch, hath a deep body, very rough scales, and the back much arched. The colours are beautiful; the back and part of the sides being of a deep green, marked with five broad black bars pointing downwards; the belly is white, tinged with red; the ventral fins of a fine scarlet; the anal fins and tail of the same colour, but rather paler. In a lake called *Llyn Raitblyn*, in Merionethshire in Wales, is a very singular variety of this fish; the back part is quite hunched, and the lower part of the backbone next the tail strangely distorted: in colour and other respects it resembles the common perch, which are as numerous in this lake as the deformed fish. They are not peculiar to this water; for Linnæus takes notice of them in a lake at Fahlun in his country. It is said that they are also met with in the Thames near Marlow.

The perch was much esteemed as food by the Romans, nor is it less admired at present as a firm and delicate fish; and the Dutch are particularly fond of it

when made into a dish called *water-fouchy*. It is a gregarious fish; and loves deep holes and gentle streams; is exceedingly voracious, and an eager biter: if the angler meets with a shoal of them, he is sure of taking every one.—It is a common notion that the pike will not attack this fish, on account of the spiny fins which the perch erects on its approach. This may be true of large fish; but it is well known that small perches are the most tempting bait which can be laid for the pike. The perch is very tenacious of life, and has been known to survive a journey of 60 miles in dry straw. It seldom grows to a large size, though Mr Pennant mentions one that weighed nine pounds; but this, he tells us, is very uncommon.

2. The *labrax*, or *basse*, is a very voracious, strong, and active fish. Ovid calls them *rabidi lupi*, a name continued to them by after-writers; and they are said to grow to the weight of fifteen pounds. The irides are silvery; the mouth large; the teeth are situated in the jaws, and are very small: in the roof of the mouth is a triangular rough space, and just at the gullet are two others of a roundish form. The scales are of a middling size, are very thick set, and adhere closely. The body is formed somewhat like that of a salmon. The colour of the back is dusky, tinged with blue. The belly is white. In young fish the space above the side-line is marked with small black spots.—It is esteemed a very delicate fish.

3. The *perca marina*, or sea-perch, is about a foot long: the head large and deformed; eyes great; teeth small and numerous. On the head and covers of the gills are strong spines. The colour red, with a black spot on the covers of the gills, and some transverse dusky lines on the sides. It is a fish held in some esteem at the table.

4. The *cernua*, or ruffe, is found in several of the English streams: it is gregarious, assembling in large shoals, and keeping in the deepest part of the water. It is of a much more slender form than the perch, and seldom exceeds six inches in length. The teeth are very small, and disposed in rows. It has only one dorsal fin, extending along the greatest part of the back; the first rays, like those of the perch, are strong, sharp, and spiny; the others soft. The body is covered with rough compact scales. The back and sides are of a dirty green, the last inclining to yellow, but both spotted with black. The dorsal fin is spotted with black; the tail marked with transverse bars.

5. The *nilotica*, or perch of the Nile, is taken about Cairo. The flesh has a sweet and exquisite flavour, and is not hard, but very white. It is one of the best fishes in the Nile; and as it is of the largest size in Egypt, it adorns a table if brought upon it entire and well fried. See *PILOT-Fish*.

PERCEPTION, is a word which is so well understood, that it is difficult for the lexicographer to give any explanation of it. It has been called the first and most simple act of the mind by which it is conscious of its own ideas. This definition, however, is improper, as it confounds perception with consciousness; although the objects of the former faculty are things without us, those of the latter the energies of our own minds. Perception is that power or faculty by which, through the medium of the senses, we have

Perca,
Perception.

Perception, the cognizance of objects distinct and apart from ourselves, and learn that we are but a small part in the system of nature. By what process the senses give us this information, we have endeavoured to show elsewhere, (See *Metaphysics*, Part I. Chap. i.) ; and we should not again introduce the subject, but to notice a singular opinion of a very able writer, whose work has been given to the public since our article alluded to had passed from the press.

Dr. Sæverus, who is an adherent to that school in which we are strongly inclined to enlist ourselves, has endeavoured to prove that no man can perceive two objects, or be conscious of two ideas at the same instant. If this be true, not only our theory of time (see *Metaphysics*, Part II. Chap. vi.) is greatly altered, but even memory itself seems to be an imaginary faculty. Is a man not conscious of his present existence, at the very instant when he thinks of a past event, or reviews a series of past transactions, it is difficult, to us indeed impossible, to conceive what idea he can have of time, or what he can mean when he says that he remembers a thing. But let us examine the reasoning by which the ingenious author endeavours to establish his opinion.

† *Difficult-
ies Metaphysical and
Literary.*

"If we reflect," says he, "upon the surprising velocity with which ideas pass through the mind, and the remarkable rapidity with which the mind turns itself, or is directed from one object of contemplation to another, this might alone give us some suspicion that we may probably be mistaken in supposing ideas to be synchronously perceived. Other arguments may be adduced to strengthen this suspicion. It will be granted, I believe, that the mind, whether immaterial or the result of organization, has certainly a wholeness or unity belonging to it, and that it is either not composed of parts, or that no one of the parts from which it originates is itself mind: in this case, it is difficult to conceive how two ideas should be impressed upon the mind at the same instant; for this would be supposing that part of the mind could receive one idea, and part another, at the same time; but if the parts do not perceive singly, this is evidently impossible. If, on the other hand, this self-division of the mind does not take place, then if two ideas are nevertheless to be perceived at the same instant, it would seem that those ideas must be so blended with each other, that neither of them could appear distinct. If we examine the manner in which a complex idea is perceived, we shall find very clearly, that the whole of such an idea is never present to the mind at once. In thinking of a centaur, for instance, can we at the same moment be thinking of the parts of a man and the parts of a horse? Can we not almost detect the gliding of the mind from the one to the other? In contemplating the complex idea of gold, are the ideas of its colour, ductility, hardness, and weight, all present to the mind at the same instant? I think, if we accurately attend to it, we shall find a perceptible time has elapsed before this complex idea has been perfectly formed in our mind: but if all the parts of a complex idea cannot be recalled at the same instant, is it not reasonable to infer that these parts are also singly impressed, and not all originally perceived at the same instant?"

This reasoning is plausible, but perhaps not convincing. Surely we have all been conscious of bodily pain

or pleasure with our eyes open, and been offended by disagreeable sounds, at the very instant that we looked at objects beautifully coloured. That our ideas pass through the mind with great velocity, and that the mind can rapidly turn itself from one subject of contemplation to another, are truths which cannot be controverted; but instead of leading us to suppose that two or more objects cannot be synchronously perceived, or two or more ideas synchronously apprehended, they appear to furnish a complete proof of the reverse of all this. For we beg leave to ask how we come to know that ideas pass with velocity through the mind, if we be not all the while conscious of something that is permanent? If we can contemplate but one idea at once, it is plainly impossible that two or more can be compared together; and therefore we cannot possibly say that any particular train has passed through the mind with a degree of velocity greater or less than that which we have usually experienced; nay, we cannot say that we have ever experienced a train of ideas at all, or even been conscious of a single idea, besides the immediate object of present apprehension. That the mind is an individual, we most readily grant; but that it should therefore be incapable of having two ideas synchronously excited in it, is a proposition for which the author has brought no evidence. That it is difficult to conceive *how* this is done, we acknowledge; but not that it is more difficult than to conceive how a *single* idea is excited in the mind; for of the mode in which mind and matter mutually operate upon each other, we can form no conception. We know that objects make an impression on the organs of sense; that this impression is by the nerves communicated to the brain, and that the agitation of the brain excites sensation in the mind: but in *what way* it excites sensation we know not; and therefore have no reason to suppose that two or more different agitations may not excite two or more synchronous sensations, as well as one agitation excites one sensation. That the agitation given to the brain operates on the mind, is known by experience; but experience gives us no information respecting the *mode* of that operation. If the mind be, as our author and we suppose, one individual, it cannot, as mind, be either divisible or extended; and therefore it is certain that the operation in question cannot be, in the proper sense of the word, impression. Hence we have no right to infer, if two objects be perceived at once, either that the idea of the one must be impressed on a part of the mind different from that which receives the impression of the other, or that the two impressions must be so blended with each other, that neither of them could appear distinct; for this would be to reason from one mode of operation to another; with which, upon acknowledged principles, it can have nothing in common.

By far the greater part of our ideas are reflects of *visible* sensations; and of every thing which we can actually see at once, we may at once contemplate the idea. That we could at once perceive a centaur, if such a being were presented to us, cannot surely be doubted by any one who has ever looked at a man on horseback; and therefore that we can at the same moment contemplate the whole idea of a centaur, is a fact of which consciousness will not permit us to doubt.— If, indeed, we choose to analyze this complex idea into

tion to its component parts, it is self-evident that the mind must glide from the one to the other, because the very analysis consists in the separation of the parts, of which, if after that process we think of them, we must think in succession : but that we may have at the same instant, either an actual or ideal view of all the parts of the centaur united, is a proposition so evident as to admit of no other proof than an appeal to experience. In contemplating what the author calls the complex idea of gold, it cannot be denied that the ideas of its colour, ductility, hardness, and weight, are never all present to the mind at the same instant : but the reason is obvious. These are not all *ideas*, in the proper sense of the word, but some of them are ideas, and some notions, acquired by very different processes and very different faculties. Colour is an idea of sensation, immediately suggested through the organ of sight ; ductility is a relative notion, acquired by repeated experiments ; and gold might be made the object of every sense, without suggesting any such notion. The writer of this article never saw an experiment made on the ductility of gold, and has therefore a very obscure and indistinct notion of that property of the metal ; but he is conscious, that he can perceive, at the same instant, the yellow colour and circular figure of a guinea, and have a very distinct, though relative notion, of its hardness.

We conclude, therefore, that the mind is capable of two or more synchronous perceptions, or synchronous ideas ; that, during every train which passes through it, it is conscious of its own permanent existence ; and that if it were limited to the apprehension of but one idea at once, it could have no remembrance of the past, or anticipation of the future, but would appear to itself, could it make any comparison, to pass away like a flash of lightning.

PERCH, in land-measuring, a rod or pole of 16½ feet in length, of which 40 in length and 4 in breadth make an acre of ground. But, by the customs of several counties, there is a difference in this measure. In Staffordshire it is 24 feet ; and in the forest of Sherwood 25 feet : the foot being there 18 inches long ; and in Herefordshire a perch of ditching is 21 feet, the perch of walling 16½ feet, and a pole of ditched ground is 12 feet, &c.

PERCHE, a territory of Orleansois in France, 35 miles long, and 30 broad ; bounded on the north by Normandy ; on the south, by Maine and Dunois ; on the east, by Beauce ; and on the west, by Maine. It takes its name from a forest, and is pretty fertile. The inhabitants carry on a pretty good trade ; and the principal town is Bellesme.

PERCOLATION, the same with FILTRATION. See CHEMISTRY, n° 568.

PERCUSSION, in mechanics, the impression a body makes in striking or striking upon another ; or the shock of two bodies in motion.

PERDICUM, in botany : A genus of the polygamia superflua order, belonging to the Symplocos class of plants ; and in the natural method ranking under the 49th order, *Compositæ*. The receptacle is naked ; the pappus is simple ; the florets bilabiate.

PERDIX. See TETRAO.

PEREASLAW, a strong populous town of Pe-

land, in the palatinate of Kiovia, situated on the river Perennius Tribec : in E. Long. 32. 44. N. Lat. 49. 46.

PERENNIALS, or PERENNIAL FLOWERS, in botany, a term applied to those plants whose roots will abide many years, whether they retain their leaves in winter or not. Those which retain their leaves are called *evergreens* ; but such as cast their leaves are named *deciduous*, or *perfoli*.

PERFECT, something to which nothing is wanting, or that has all the requisites of its nature and kind.

PERFECT Cadence, in music. See CADENCE.

PERFECT Tense, in grammar. See PRÆTERITE.

PERFECTION, the state or quality of a thing PERFECT.

Perfection is divided, according to Chauvinus, into physical, moral, and metaphysical.

Physical or natural perfection, is that whereby a thing has all its powers and faculties, and those too in full vigour ; and all its parts both principal and secondary, and those in their due proportion, constitution, &c. in which sense man is said to be perfect when he has a sound mind in a sound body. This perfection is by the schools frequently termed *immutabilis*, because a thing is enabled thereby to perform all its operations.

Moral perfection is an eminent degree of virtue or moral goodness, to which men arrive by repeated acts of piety, beneficence, &c. This is usually subdivided into absolute or inherent, which is actually in him to whom we attribute it ; and imputative, which exists in some other, and not in him it is attributed to.

Metaphysical, transcendental, or essential perfection, is the possession of all the essential attributes, or of all the parts necessary to the integrity of a substance ; or it is that whereby a thing has or is provided of every thing belonging to its nature. This is either absolute, where all imperfection is excluded, such is the perfection of God ; or *secundum quid*, and in its kind.

PERFORANS MANUS,

PERFORANS Pells

PERFORATUS MANUS.

PERFORATUS Pells.

} See ANATOMY, Tab. of the *Muscles*.

PERFUME, denotes either the volatile effluvia from any body affecting the organ of smelling, or the substance emitting those effluvia ; in which last sense the word is most commonly used. The generality of perfumes are made up of musk, ambergris, civet, rose and cedar woods, orange-flowers, jessamines, jonquil, tuberoses, and other odiferous flowers. Those drugs commonly called aromatics, such as storax, frankincense, benzoin, cloves, mace, &c. enter the composition of a perfume ; some are also composed of aromatic herbs or leaves, as lavender, marjoram, sage, thyme, hyssop, &c.

The use of perfumes was frequent among the Hebrews, and among the orientals in general, before it was known to the Greeks and Romans. In the time of Moses perfumes must have been known in Egypt, since he speaks of the art of the perfumer, and gives the composition of two kinds of perfumes (Exod. xxx. 25.), of which one was to be offered to the Lord upon the golden altar which was in the holy place ; and the other

Perfume.

Perfume
||
Pergamum.

other was appointed for the anointing of the high priest and his sons (*ibid.* 34, &c.), as also of the tabernacle, and all the vessels that were used in divine service.

The Hebrews had also perfumes which they made use of in embalming their dead. The composition is not known, but it is certain that they generally made use of myrrh, aloes, and other strong and astringent drugs, proper to prevent putrefaction (John xix. 49.) See the article EMBALMING.

Besides the perfumes for these purposes, the scripture mentions other occasions whereon the Hebrews used perfumes. The spouse in the Canticles (i. 3.) commends the scent of the perfumes of her lover; and her lover in return says, that the scent of the perfumes of his spouse surpasses the most excellent odours (*id.* iv. 10—14.) He names particularly the spikenard, the calamus, the cinnamon, the myrrh, and the aloes, as making a part of these perfumes. The voluptuous woman described by Solomon (Prov. vii. 17.) says, that she had perfumed her bed with myrrh, aloes, and cinnamon. The epicures in the book of Wisdom (ii. 7.) encourage one another to the luxuriant use of odours and costly perfumes.

Isaiah (lvii. 9.) reproaches Judea, whom he describes as a spouse faithless to God, with being painted and perfumed to please strangers, "Thou wentest to the king with ointment, and didst increase thy perfumes." Ezekiel (xxiii. 41.) seems to accuse the Jews with having profaned the odours and perfumes, the use of which was reserved to sacred things, by applying them to their own use.

They came afterwards to be very common among the Greeks and Romans, especially those composed of musk, ambergris, and civet. The *nardus* and *malobathrum* were held in much estimation, and were imported from Syria. The *unguentum nardinum* was variously prepared, and contained many ingredients. *Malobathrum* was an Indian plant. Perfumes were also used at sacrifices to regale the gods; at feasts, to increase the pleasures of sensation; at funerals, to overpower cadaverous smells, and please the manes of the dead; and in the theatres, to prevent the offensive effluvia, proceeding from a crowd, from being perceived.

Since people are become sensible of the harm they do to the head, perfumes are generally disused among us; however, they are still common in Spain and Italy.

PERGAMA (Virgil), the citadel of Troy; which, because of its extraordinary height, gave name to all high buildings (Servius). Others say the walls of Troy were called *Pergama*.

PERGAMUM, (Pliny); called also *Pergamea*, (Virgil); *Pergamia*, (Plutarch); a town of Crete, built by Agamemnon in memory of his victory, (Velleius). Here was the burying-place of Lycurgus, (Aristoxenus, quoted by Plutarch). It was situated near Cydonia (Servius); to what point not said; but Scylax helps him out, who places the Dactynnean temple of Diana, which stood near Cydonia (Strabo), to the north of the territory of Pergamia.—Another PERGAMUM (Pliny, Strabo); a town of Mysia, situated on the Caicus, which runs by it. It was the royal residence of Eumenes, and of the kings of the

Attali (Livy). There an ancient temple of *Æsculapius* stood; an asylum (Tacitus). The ornament of Pergamum was the royal library, vying with that of Alexandria in Egypt; the kings of Pergamum and Egypt rivalling each other in this respect (Pliny). Strabo ascribes this rivalry to Eumenes. Plutarch reckons up 200,000 volumes in the library at Pergamum. Here the *membrana pergamena*, whence the name *parchment*, were invented for the use of books, (Varro, quoted by Pliny). The country of Galen, and of Oribasius chief physician to Julian the Apostate (Eunapius), called by some the *ape of Galen*. Here P. Scipio died (Cicero). Attalus son of Eumenes dying without issue, bequeathed his kingdom to the Roman people, who reduced it to a province, (Strabo). *Pergæus*, the epithet (Martial). Here was one of the nine *conventus juridici*, or assemblies of the *Asia Romana*, called *Pergamenus*, and the ninth in order (Pliny); which he also calls *jurisdictio Pergamena*.

PERGAMUS, an ancient kingdom of Asia, formed out of the ruins of the empire of Alexander the Great. It commenced about the year 283. The first sovereign was one Philetærus an eunuch, by birth a Paphlagonian, of a mean descent, and in his youth a menial servant to Antigonus one of Alexander's captains. He afterwards served Lyfimachus king of Macedon and Thrace, who appointed him keeper of his treasures lodged in Pergamus. While he held this employment, having fallen under the displeasure of Arsinoë wife to Lyfimachus, she found means to make a quarrel between him and his master; upon which Philetærus seized on the castle of Pergamus, together with the treasures entrusted to his care, amounting to 90,000 talents. At first he offered his service, together with his treasure, to Seleucus king of Syria: but both Seleucus and Lyfimachus dying soon after, he kept possession of the town and treasure also till his death; which happened 20 years after his revolt from Lyfimachus.

Philetærus left the city of Pergamus to his brother, or, according to some, to his brother's son Eumenes I. and he, laying hold of the opportunity offered by the dissensions among the Seleucidæ, possessed himself of many strong-holds in the province of Asia; and having hired a body of Galatians, defeated Antiochus, as he was returning from a victory gained over his brother Seleucus Callinicus. By this victory he obtained possession of the greater part of Asia: however, he did not long enjoy his acquisitions; for he died next year of immoderate drinking, a vice to which he was greatly addicted.

Eumenes was succeeded by Attalus I. nephew of Philetærus, and the first who took upon him the title of king of Pergamus. He defeated the Gauls, who were desirous of settling in his territory; and, according to Livy, was the first of the Asiatic princes who refused to pay a contribution to these barbarians. When Seleucus Ceraunus was engaged in other wars, he invaded his territories, and conquered all the provinces on this side of Mount Taurus; but was soon driven out of his new acquisitions by Seleucus and his grandfather Achæus, who entering into an alliance against him, deprived him of all his newly acquired territories, and even besieged him in his capital. Upon this Attalus

Attalus invited to his assistance the Gauls who had settled in Thrace; and with their help not only obliged the enemy to raise the siege of Pergamus, but quickly recovered all the provinces he had lost. After this he invaded Ionia and the neighbouring provinces, where several cities voluntarily submitted to him. The Teians, Colophonians, with the inhabitants of Egea and Lemnos, sent deputies declaring themselves ready to acknowledge him for their sovereign; the Carſenes, on the other side the river Lycus, opened their gates to him, having first expelled the governor set over them by Achæus. From thence he advanced to Apia, and encamping on the banks of the river Megithus, received homage from the neighbouring nations. But here the Gauls, being frightened by an eclipse of the moon, refused to proceed farther; which obliged Attalus to return to the Hellespont, where he allowed his allies to settle, giving them a large and fruitful territory, and promising that he would always assist and protect them to the utmost of his power.

Attalus having thus settled his affairs with equal honour and advantage to himself, entered into an alliance with Rome, and afterwards joined them in their war against Philip king of Macedon. Here he had the command of the Rhodian fleet; with which he not only drove the Macedonians quite out of the seas, but having landed his men, he, in conjunction with the Athenians, invaded Macedon, and obliged Philip to raise the siege of Athens, which he had greatly distressed; for which services the Athenians not only heaped on him all the favours they could, but called one of their tribes by his name; an honour they had never bestowed on any foreigner before.

Attalus, not contented with all he had yet done against Philip, attempted to form a general confederacy of the Greeks against him. But while he was haranguing the Bœotians to this purpose, and exhorting them with great vehemence to enter into an alliance with the Romans against their common enemy, he fell down speechless. However, he came to himself again, and desired to be carried by sea from Thebes to Pergamus, where he died soon after his arrival, in the 72d year of his age and 43d of his reign.

This prince was a man of great generosity, and such an enthusiast in learning and learned men, that he caused a grammarian named *Daphidas* to be thrown into the sea from the top of a high rock, because he spoke disrespectfully of Homer.

Attalus was succeeded by his eldest son Eumenes II. He was exceedingly attached to the Romans, inasmuch that he refused the daughter of Antiochus the Great in marriage, lest he should thus have been led into a difference with that people. He also gave notice to the Roman senate of the transactions of Ariarathes king of Cappadocia, who was making great preparations both by sea and land. Nor did Eumenes stop here; for when he saw the war about to break out between Antiochus and the Romans, he sent his brother Attalus to Rome to give information of the proceedings of Antiochus. The senate heaped honours both on Eumenes and his brother; and in the war which followed, gave the command of their fleet to the king of Pergamus in conjunction with C. Livius Salinator. The victory gained on this occasion was in a great measure

owing to Eumenes, who headed some of the enemy's ships in person, and during the whole action behaved with uncommon bravery. Some time afterwards Eumenes, entering the territories of Antiochus with a body of 5000 men, ravaged all the country about Thyatira and returned with an immense booty. But in the mean time Antiochus invading Pergamus in his turn, ravaged the whole country, and laid siege to the capital. Attalus, the king's brother, held out with an handful of men till the Achæans, who were in alliance with Eumenes, sent 1000 foot and 100 horse to his assistance. As this small force of auxiliaries were all chosen men, and commanded by an experienced officer, they behaved with such bravery that the Syrians were obliged to raise the siege. At the battle of Magnesia, too, Eumenes behaved with the greatest bravery; not only sustaining the first attack of the enemy's elephants, but driving them back again on their own troops, which put the ranks in disorder, and gave the Romans an opportunity of giving them a total defeat by attacking them opportunely with their horse. In consequence of this defeat, Antiochus was obliged to conclude a peace with the Romans on such terms as they pleased to prescribe; one of which was, that he should pay Eumenes 400 talents, and a quantity of corn, in recompence for the damage he had done him.

Eumenes now thought of obtaining some reward from the Romans equivalent to the services he had done them. Having gone to Rome, he told the senate, that he was come to beg of them that the Greek cities which had belonged to Antiochus before the commencement of the late war, might now be added to his dominions; but his demand was warmly opposed by the ambassadors from Rhodes, as well as by deputies from all the Greek cities in Asia. The senate, however, after hearing both parties, decided the matter in favour of Eumenes, adding to his dominions all the countries on this side of Mount Taurus which belonged to Antiochus; the other provinces lying between that mountain and the river Mæander, excepting Lycia and Caria, were bestowed on the Rhodians. All the cities, which had paid tribute to Attalus, were ordered to pay the same to Eumenes; but such as had been tributary to Antiochus were declared free.

Soon after this Eumenes was engaged in a war with Prusias king of Bithynia, who made war upon him by the advice of Hannibal the celebrated Carthaginian general. But Eumenes, being assisted by the Romans, defeated Prusias in an engagement by sea, and another by land; which so disheartened him, that he was ready to accept of peace on any terms. However, before the treaty was concluded, Hannibal found means to draw Philip of Macedon into the confederacy, who sent Philocrates, an old and experienced officer, with a considerable body of troops to join Prusias. Hereupon Eumenes sent his brother Attalus to Rome with a golden crown, worth 15,000 talents, to complain of Prusias for making war on the allies of the Roman people without any provocation. The senate accepted the present, and promised to adjust every thing to the satisfaction of their friend Eumenes, whom they looked upon to be the most steady ally they had in Asia. But in the mean time Prusias, having ventured another sea-fight, by a contrivance of Hannibal's, gained a complete

Pergamus. complete victory. The Carthaginian commander advised him to fill a great many earthen vessels with various kinds of serpents and other poisonous reptiles, and in the heat of the fight to throw them into the enemies' ships so as to break the pots and let the serpents loose. All the soldiers and seamen were commanded to attack the ship in which Eumenes was, and only to defend themselves as well as they could against the rest; and that they might be in no danger of mistaking the ship, an herald was sent before the engagement with a letter to the king. As soon as the two fleets drew near, all the ships of Prusias, singling out that of Eumenes, discharged such a quantity of serpents into it, that neither soldiers nor sailors could do their duty, but were forced to fly to the shore, lest they should fall into the enemy's hands. The other ships, after a faint resistance, followed the king's example, and were all driven ashore with great slaughter, the soldiers being no less annoyed by the stings of the serpents, than by the weapons of the enemy. The greater part of the ships of Eumenes were burnt, several taken, and the others so much shattered that they became quite unserviceable. The same year Prusias gained two remarkable victories over Eumenes by land, both of which were entirely owing to stratagems of Hannibal. But, while matters were thus going on to the disadvantage of Eumenes, the Romans interfered, and by their deputies not only put an end to the differences between the two kings, but prevailed on Prusias to betray Hannibal; upon which he poisoned himself, as hath been related under the article HANNIBAL.

Eumenes being thus freed from such a dangerous enemy, engaged in a new war with the kings of Capadocia and Pontus, in which also he proved victorious. His friendship for the Romans he carried to such a degree of enthusiasm, that he went in person to Rome to inform them of the machinations of Perseus king of Macedonia. He had before quarrelled with the Rhodians, who sent ambassadors to Rome to complain of him. But as the ambassadors happened to arrive while the king himself was present in the city, the Rhodian ambassadors could not obtain any hearing, and Eumenes was dismissed with new marks of favour. This journey, however, had almost proved fatal to him; for, on his return, as he was going to perform a sacrifice at Delphi, two assassins, sent by Perseus, rolled down two great stones upon him as he entered the straits of the mountains. With one he was dangerously wounded on the head and with the other on the shoulder. He fell with the blows from a steep place, and thus received many other bruises; so that he was carried on board his ship when it could not well be known whether he was dead or alive. His people, however, soon finding that he was still alive, conveyed him to Corinth, and from Corinth to Ægina, having caused their vessels to be carried over the Isthmus.

Eumenes remained at Ægina till his wounds were cured, which was done with such secrecy, that a report of his death was spread all over Asia, and even believed at Rome; nay, his brother Attalus was so convinced of the truth of this report, that he not only assumed the government, but even married Stratonice the wife of Eumenes. But in a short time Eumenes

convinced them both of his being alive, by returning to his kingdom. On the receipt of this news, Attalus resigned the sovereignty in great haste, and went to meet his brother; carrying an halberd, as one of his guards. Eumenes received both him and the queen with great tenderness, nor did he ever say any thing which might tend to make them uneasy; only it is said he whispered in his brother's ear when he first saw him, "Be in no haste to marry my wife again till you are sure that I am dead."

The king being now more than ever exasperated against Perseus, joined the Romans in their war against him; but during the course of it he suddenly cooled in his affection towards those allies whom he had hitherto served with so much zeal, and that to such a degree, that he admitted ambassadors from Perseus, and offered to stand neuter if he would pay him 1000 talents, and for 1500, to influence the Romans to grant him a safe and honourable peace. But these negotiations were broke off without effect, by reason of the distrust which the two kings had of one another. Eumenes could not trust Perseus unless he paid him the money beforehand; while, on the other hand, Perseus did not care to part with the money before Eumenes had performed what he promised; neither could he be induced to pay the sum in question, though the king of Pergamus offered to give hostages for the performance of his promise. What the reason of such a sudden change in the disposition of Eumenes was, is nowhere told; however, the fact is certain. The negotiations above-mentioned were concealed from the Romans as long as possible; but they soon came to be known: after which the republic began to entertain no small jealousy of their old friend, and therefore heaped favours on his brother Attalus, without taking any notice of the king himself. Eumenes had sent him to Rome to congratulate the senate on the happy issue of the war with Perseus, not thinking that his practices had been discovered. However, the senate, without taking any notice of their disaffection to Eumenes at first, entertained Attalus with the greatest magnificence; then several of the senators who visited him proceeded to acquaint him with their suspicions of the king, and desired Attalus to treat with them in his own name, assuring him, that the kingdom of Pergamus would be granted him, if he demanded it, by the senate. These speeches had at first some effect; but Attalus, being of an honest disposition, and assisted by the advice of a physician called *Stratius*, a man of great probity, resolved not to comply with their desire. When he was admitted to the senate, therefore, he first congratulated them on the happy issue of the Macedonian war, then modestly recounted his own services; and lastly, acquainted them with the motive of his journey; intreated them to send ambassadors to the Gauls, who by their authority might secure his brother from any danger of their hostilities; and he requested them also, that the two cities of Ænus and Maronea might be bestowed on himself. The senate, imagining that Attalus designed to choose some other day to sue for his brother's kingdom, not only granted all his requests, but sent him richer and more magnificent presents than they had ever done before. Upon this Attalus immediately set out on his return to Pergamus; which so provoked the senators, that they declared

us. declared the cities free which they had promised to Attalus, thus rendering ineffectual their promise which they were ashamed openly to revoke; and as for the Gauls, who were on all occasions ready to invade the kingdom of Pergamus, they sent ambassadors to them, with instructions to behave in such a manner as would rather tend to encourage them in their design than dissuade them from it.

Eumenes, being alarmed at those proceedings, resolved to go in person to Rome, in order to justify himself. But the senate, having already condemned him in their own minds, resolved not to hear his vindication. For this reason, as soon as they heard of his design, they made an act that no king should be permitted to enter the gates of Rome. Eumenes, however, who knew nothing of this act, set forward on his journey, and landed at Brundisium; but no sooner did the Roman senate get intelligence of his arrival there, than they sent a quæstor acquainting him with the decree of the senate; and telling him at the same time, that if he had any business to transact with the senate, he was appointed to hear it, and transmit it to them; but if not, that the king must leave Italy without delay. To this Eumenes replied, that he had no business of any consequence to transact, and that he did not stand in need of any of their assistance; and without saying a word more, went on board his ship, and returned to Pergamus.

On his return home, the Gauls, being encouraged by the cold reception which he had met with at Rome, invaded his territories, but were repulsed with great loss by the king, who afterwards invaded the dominions of Prusias, and possessed himself of several cities. This produced new complaints at Rome; and Eumenes was accused, not only by the ambassadors of Prusias, but also by those of the Gauls and many cities in Asia, of keeping a secret correspondence with Perseus king of Macedon. This last charge was confirmed by some letters which the Romans themselves had intercepted; so that Eumenes found it impossible to keep up his credit any longer at Rome, though he sent his brothers Athenæus and Attalus thither to intercede for him. The senators, in short, had conceived the most implacable hatred against him, and seemed absolutely bent on his destruction, when he died, in the 39th year of his reign, leaving his kingdom and his wife to his brother Attalus. He left one son, but he was an infant, and incapable of governing the kingdom; for which reason Eumenes chose rather to give the present possession of the crown to his brother, reserving the succession to his son, than to endanger the whole by committing the management of affairs to his son's tutors.

Attalus, in the beginning of his reign, found himself greatly distressed by Prusias king of Bithynia, who not only overthrew him in a pitched battle, but advanced to the very walls of Pergamus, ravaging the country as he marched along; and at last reduced the royal city itself. The king, however, saved himself by a timely flight, and dispatched ambassadors to Rome, complaining of the bad usage of Prusias. The latter endeavoured to defend himself, and to throw the blame on Attalus. But, after a proper inquiry was made into the matter, Prusias was found to be entirely in the wrong; in consequence of which, he was at last obli-

gated to conclude a peace with his adversary on the following terms. 1. That he should immediately deliver up to Attalus 20 ships with decks. 2. That he should pay 500 talents to Attalus within the space of 20 years. 3. That he should pay 100 talents to some of the other Asiatic nations by way of reparation for the damages they had sustained from him. And, 4. Both parties should be content with what they had before the beginning of the war.

Some time after this, Prusias having made an unnatural attempt on the life of his son Nicomedes, the latter rebelled, and, with the assistance of Attalus, drove his father from the throne, and, as is said, even murdered him in the temple of Jupiter. The Romans took no notice of these transactions, but showed the same kindness to Attalus as formerly. The last enterprise in which we find Attalus engaged, was against Andriæus the pretended son of Perseus king of Macedon, where he assisted the Romans; after which he gave himself up entirely to ease and luxury, committing state affairs entirely to his ministers; and thus continued to his death, which happened in the 82d year of his age, about 138 B. C.

Attalus II. was succeeded by Attalus III. the son of Eumenes; for the late king, considering that he only held the crown as a trust for his nephew, passed by his own children in order to give it to him, tho' he appears to have been by no means worthy of it. He is said to have been deprived of his senses thro' the violence of his grief for his mother's death; and indeed, throughout his whole reign, he behaved more like a madman than any thing else. Many of his subjects of the highest quality were cut off with their wives and children, upon the most groundless suspicions; and for these executions he made use of mercenaries hired out from among the most barbarous nations. Thus he proceeded till he had cut off all the best men in the kingdom; after which he fell into a deep melancholy, imagining that the ghosts of those whom he had murdered were perpetually haunting him. On this he shut himself up in his palace, put on a mean apparel, let his hair and beard grow, and sequestered himself from all mankind. At last he withdrew from the palace, and retired into a garden, which he cultivated with his own hands, and filled with all sorts of poisonous herbs. These he used to mix with wholesome pulse, and send packets of them to such as he suspected. At last, being weary of this amusement, and living in solitude, because nobody durst approach him, he took it in his head to follow the trade of a founder, and make a brazen monument. But, while he laboured at melting and casting the brass, the heat of the sun and furnace threw him into a fever, which in seven days put an end to his tyranny, after he had sat on the throne five years.

On the death of the king, a will was found, by which he left the Roman people heirs of all his goods; upon which they seized on the kingdom, and reduced it to a province of their empire by the name of *Asia Proper*. But Aristonicus, a son of Eumenes by an Ephesian courtesan, reckoning himself the lawful heir to the crown, could by no means be satisfied with this usurpation of the Romans, and therefore assembled a considerable army to maintain his pretensions. The people in general, having been accustomed to a mo-

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narchy, dreaded a republican form of government; in consequence of which, they assisted Aristonicus, and soon put him in a condition to reduce the whole kingdom. The news, however, were soon carried to Rome; and Lucinius Crassus, the pontifex maximus, was sent into the east, with orders to enforce obedience to the king's will. Historians take no notice of any forces which were sent along with this commander; whence it is supposed, that he depended on assistance from the Asiatics, who were in alliance with Rome, or from the Egyptians. But when he came thither, he found both the Syrians and Egyptians so reduced, that he could not expect any assistance from them. However, he was soon supplied with troops in plenty by the kings of Pontus, Bithynia, Cappadocia, and Paphlagonia; but managed matters so ill, that he was entirely defeated and taken prisoner. Those who took him, designed to carry him to Aristonicus; but he, not able to endure the distance, would have laid violent hands on himself if he had not been disarmed. However, being allowed to keep a rod for managing the horse on which he sat, he struck a Thracian soldier who stood near him so violently with it, that he beat out one of his eyes; upon which the other drew his sword, and ran him thro' on the spot. His head was brought to Aristonicus, who exposed it to public view; but the body was honourably buried.

Aristonicus had no great time to enjoy the fruits of his victory. Indeed he behaved very improperly after it; for, instead of preparing to oppose the next army, which he might have been assured the Romans would send against him, he spent his time in feasting and revelling. But he was soon roused out of his lethargy by Perpenna the new consul, who having assembled with incredible expedition the troops of the allies, came unexpectedly upon him, obliged him to venture an engagement at a disadvantage, and entirely defeated him. Aristonicus fled to a city called *Stratonice*; but was so closely pursued by the conqueror, that the garrison, having no method of supplying themselves with provisions, delivered up their leader, as well as a philosopher named *Blossius*, who had been the companion and counsellor of Aristonicus. The philosopher behaved with great resolution after being taken, and openly defended his siding with Aristonicus, because he thought his cause just. He exhorted the latter to prevent the disgrace and misery of captivity by a voluntary death; but Aristonicus, looking upon death as a greater misery than any captivity, suffered himself to be treated as his conquerors pleased.

In the mean time, a new consul, named *Manius Aquilius*, being arrived from Rome, sent a most haughty message to Perpenna, requiring him immediately to deliver up Aristonicus, as a captive belonging to his triumph when the war should be ended. With this demand Perpenna refused to comply, and his refusal had almost produced a civil war. However, this was prevented by the death of Perpenna, which happened soon after the dispute commenced. The Pergame-nians, notwithstanding the defeat and captivity of their leader, still held out with such obstinacy, that Aquilius was obliged to besiege, and take by force, almost every city in the kingdom. In doing this, he took a very effectual, though exceeding cruel method. Most of the cities in the kingdom had no other water

than what was brought from a considerable distance in Perg aqueducts. These Aquilius did not demolish, but poisoned the water, which produced the greatest abhorrence of him throughout all the east. At last, however, the whole country being reduced, Aquilius triumphed, the unhappy Aristonicus was led in chains before his chariot, and probably ended his miserable life in a dungeon. The country remained subject to the Romans while their empire lasted, but is now in the hands of the Turks. The city is half ruined, and is still known by the name of *Pergamus*. It is inhabited by about 3000 Turks, and a few families of poor Christians. E. Long. 27. 27. N. Lat. 30. 3.

PERGUNNAH, in the language of Hindostan, means the largest subdivision of a province, whereof the revenues are brought to one particular *head Cutchery*, from whence the accounts and cash are transmitted to the general *Cutchery* of the province.

PERIAGOGE, in rhetoric, is used where many things are accumulated into one period which might have been divided into several.

PERIAGUA, a sort of large canoe made use of in the Leeward islands, South America, and the gulf of Mexico. It is composed of the trunks of two trees hollowed and united together; and thus differs from the canoe, which is formed of one tree.

PERIANDER, tyrant of Corinth and Corcyra, was reckoned among the seven wise men of Greece; though he might rather have been reckoned among the most wicked men, since he changed the government of his country, deprived his countrymen of their liberty, usurped the sovereignty, and committed the most shocking crimes. In the beginning of his reign he behaved with mildness; but after his having sent to the tyrant of Syracuse to consult him on the safest method of government, he abandoned himself to cruelty. The latter, having heard Periander's envoys, took them into a field, and, instead of answering them, pulled up before them the ears of corn which exceeded the rest in height. Periander, on being told of this action, understood what was meant by it. He first secured himself by a good guard, and then put the most powerful Corinthians to death. He abandoned himself to the most enormous crimes; committed incest with his mother, kicked to death his wife Melissa, daughter of Procles king of Epidaurus, notwithstanding her being with child; and was so enraged at Lycophron, his second son, for lamenting his mother's death, that he banished him into the island of Corcyra. Yet he passed for one of the greatest politicians of his time; and Heraclides tells us, that he forbade voluptuousness; that he imposed no taxes, contenting himself with the custom arising from the sale and the import and export of commodities; that, tho' wicked himself, he hated the wicked, and caused all pimps to be drowned; lastly, that he established a senate, and settled the expence of its members. He died 585 B. C.

PERIANTHIUM, (from *περι* "round," and *ανθος* "the flower,") the flower-cup properly so called, the most common species of calyx, placed immediately under the flower, which is contained in it as in a cup. See BOTANY, p. 433, col. 1.

PERICARDIUM, in anatomy, a membranous bag filled with water, which contains the heart in man and

and many other animals. It is formed by a duplication of the mediastinum, or membrane which divides the thorax into two unequal parts. See ANATOMY, n° 121.

PERICARPIUM, (from *περι* "round," and *καρπός* "fruit,") the seed vessel; an entrail of the plant big with seeds, which it discharges when ripe. The seed-vessel is in fact the developed seed bud, and may very properly be compared to the fecundated ovary in animals; for it does not exist till after the fertilizing of the seeds by the male-dust, and the consequent fall of the flower. All plants, however, are not furnished with a seed-vessel; in such as are deprived of it, the receptacle or calyx performs its functions by inclosing the seeds, as in a matrix, and accompanying them to perfect maturity.

PERICHORUS, in antiquity, a name given by the Greeks to their profane games or combats, that is, to such as were not consecrated to any of the gods.

PERICLES, was one of the greatest men that ever flourished in Greece. He was educated with all imaginable care; and beside other masters, he had for his tutors Zeno, Eleates, and Anaxagoras. He learned from the last of these to fear the gods without superstition, and to account for an eclipse from a natural cause. Many were unjust enough to suspect him of atheism, because he had perfectly studied the doctrine of that philosopher. He was a man of undoubted courage; and of such extraordinary eloquence, supported and improved by knowledge, that he gained almost as great an authority under a republican government as if he had been a monarch; but yet he could not escape the satirical strokes of the comic poets. His dissoluteness with the women was one of the vices with which he was chiefly charged. He died the third year of the Peloponnetian war, after long sickness, which had weakened his understanding. Aspasia, Pericles's favourite, was a learned woman of Miletus: she taught Socrates rhetoric and politics. As Pericles cared not much for his wife, he willingly gave her up to another, and married Aspasia, whom he passionately loved.

PERICRANIUM, in anatomy, a thick solid coat or membrane covering the outside of the cranium or skull. See ANATOMY, n° 4.

PERIGEE, in astronomy, that point of the sun or moon's orbit wherein they are at the least distance from the earth, in which sense it stands opposed to apogee.

PERIGEX, an ancient episcopal town of France, capital of the province of Perigord, seated on the river Isle, in E. Long. o. 33. N. Lat. 45. 18. It is remarkable for the ruins of the temple of Venus, and an amphitheatre.

PERIGORD, a province of France, which makes part of Guienne, bounded on the north by Angoumois and a part of Marche, and on the east by Quercy and Limosin; on the south by Agenois and Bazadois; and on the west, by Bourleois, Angoumois, and a part of Saintonge. It is about 83 miles in length, and 60 in breadth. It abounds in iron mines, and the air is pure and healthy. Penzeux is the capital town.

PERIGORD Stone, an ore of manganese, of a dark grey colour, like the basalt or trapp. It may be scraped with a knife, but is extremely difficult to

be broken. It is found of no regular figure, is very compact, heavy, and as black as charcoal. Its appearance is glittering and striated, like the ore of antimony; its particles being disposed in the form of needles, crossing one another without any agglutination, inso-much that some are loose as iron-filings when stuck to a loadstone, resembling the scoria from a blacksmith's furnace. By calcination it becomes harder and of a reddish-brown colour, but is not attracted by the magnet. It has a considerable specific gravity, does not melt *per se*, but with borax runs into a glass of the colour of an amethyst. It is scarcely affected by nitrous acid without the addition of sugar. It seems also to contain some argil and iron. It is met with in Gascony and Dauphny in France, and in some parts of England. It is employed by the French potters and enamellers in the glassy varnish of their earthen wares.

PERIGRAPHE, a word usually understood to express a careless or inaccurate delineation of any thing; but in Vesalius it is used to express the white lines or impressions that appear on the musculus rectus of the abdomen.

PERIHELUM, in astronomy, that part of a planet or comet's orbit wherein it is in its least distance from the sun, in which sense it stands in opposition to aphelium.

PERIMETER, in geometry, the bounds or limits of any figure or body. The perimeters of surfaces or figures are lines; those of bodies are surfaces. In circular figures, instead of perimeter, we say circumference, or periphery.

PERINÆUM, or **PERINEUM**, in anatomy, the space between the anus and the parts of generation, divided into two equal lateral divisions by a very distinct line, which is longer in males than in females.

PERINSKIOLD (John), a learned Swedish writer, born at Stregnesia in Sudermania, in 1654, studied under his father, who was professor of eloquence and poetry, and afterwards became well skilled in the antiquities of the north. He was made professor at Upsal, secretary antiquary of the king of Sweden, and counsellor of the chancery of antiquities. He died in 1720. His principal works are: 1. A History of the Kings of Norway. 2. A History of the Kings of the North. 3. An Edition of John Messenius on the Kings of Sweden, Norway, and Denmark, in 14 vols folio, &c. All Perinskiold's works are excellent, and highly esteemed.

PERIOD, in astronomy, the time taken up by a star or planet in making a revolution round the sun; or the duration of its course till it return to the same part of its orbit. See PLANET.

The different periods and mean distances of the several planets are as follow:

	Days	h.	'	"	mean Dist.
Saturn	10579	6	36	26	953800
Jupiter	4332	12	20	35	520110
Mars	686	23	27	30	152309
Earth	365	6	9	30	100000
Venus	224	16	49	24	72333
Mercury	87	23	15	53	36710

There is a wonderful harmony between the distances
T 2 of

Period.

of the planets from the sun, and their periods round him; the great law whereof is, that the squares of the periodical times of the primary planet, are to each other as the cubes of their distances from the sun: and likewise, the squares of the periodical times of the secondaries of any planet are to each other as the cubes of their distances from that primary. This harmony among the planets is one of the greatest confirmations of the Copernican hypothesis. See ASTRONOMY, n° 414.

For the periods of the moon, see ASTRONOMY, n° 422, and observe *Index* to astronomy.

The periods of several comets are now pretty well ascertained. See ASTRONOMY, n° 171, &c.

PERIOD, in chronology, denotes a revolution of a certain number of years, or a series of years, whereby, in different nations, and on different occasions, time is measured; such are the following.

Calippic PERIOD, a system of seventy-six years. See CALIPPIC, and ASTRONOMY, n° 11, &c.

Dionysian PERIOD, or *Victorian Period*, a system of 532 lunæ-solar and Julian years; which being elapsed, the characters of the moon fall again upon the same day and feria, and revolve in the same order, according to the opinion of the ancients.

This period is otherwise called the *great paschal cycle*, because the Christian church first used it to find the true time of the pascha or easter. The sum of these years arise by multiplying together the cycles of the sun and moon.

Hipparchus's PERIOD, is a series of 304 solar years, returning in a constant round, and restoring the new and full moons to the same day of the solar year, according to the sentiment of Hipparchus. This period arises by multiplying the Calippic period by four.—Hipparchus assumed the quantity of the solar year to be 365 days 5 hours 55' 12"; and hence concluded, that in 104 years Calippus's period would err a whole day. He therefore multiplied the period by four, and from the product cast away an entire day. But even this does not restore the new and full moons to the same day throughout the whole period; but they are sometimes anticipated 1 day 8 hours 23' 29" 20". See ASTRONOMY, n° 14.

Julian PERIOD. See JULIAN.

PERIOD, in grammar, denotes a small compass of discourse, containing a perfect sentence, and distinguished at the end by a point, or full stop, thus (.) ; and in members or divisions marked by commas, colons, &c.

Father Buffier observes two difficulties in the use of the period, or point; i. e. in distinguishing it from the colon, or double point; and in determining justly the end of a period, or perfect sentence. It is remarked, that the supernumerary members of a period, separated from the rest by colons and semicolons, usually commence with a conjunction: yet it is true these same conjunctions sometimes rather begin new periods than supernumerary members of old ones. It is the sense of things, and the author's own discretion, that must make the proper distinction which of the two in effect it is. No rules will be of any service, unless this be admitted as one, that when what follows the conjunction is of as much extent as what precedes it, it is usually a new period; otherwise not.

The second difficulty arises hence, that the sense appears perfect in several short detached phrases, wherein it does not seem there should be periods; a thing frequent in free discourse: as, *We are all in suspense: make your proposals immediately: you will be to blame for detaining us longer.* Where it is evident, that simple phrases have perfect senses like periods, and ought to be marked accordingly; but that the shortness of the discourse making them easily comprehended, the pointing is neglected.

De Colonia defines period a short but perfect sentence, consisting of certain parts or members, depending one on another, and connected together by some common vinculum. The celebrated definition of Aristotle is, a period is a discourse which has a beginning, a middle, and an end, all visible at one view. Rhetoricians consider period, which treats of the structure of sentences, as one of the four parts of composition. The periods allowed in oratory are three: A period of two members, called by the Greeks *dicolos*, and by the Latins *bimembris*; a period of three members, *tricolos*, *trimembris*; and a period of four, *quadrimebris*, *tetracolos*. See PUNCTUATION.

PERIOD, in numbers, is a distinction made by a point or comma, after every sixth place, or figure; and is used in numeration, for the reader distinguishing and naming the several figures or places; which see under NUMERATION.

PERIOD, in medicine, is applied to certain diseases which have intervals, and returns, to denote an entire course or circle of such disease; or its progress from any state through all the rest till it return to the same again.

Galen describes period as a time composed of an intensification and remission; whence it is usually divided into two parts, the paroxysm or exacerbation, and remission.

In intermitting fevers, the periods are usually stated and regular; in other diseases, as the epilepsy, gout, &c. they are vague or irregular.

PERIOD, in oratory. See there, n° 47.

PERIODIC, or PERIODICAL, something that terminates and comprehends a period; such is a periodic month; being the space of time wherein the moon dispatches her period.

PERIOECI, *περιοικοι*, in geography, such inhabitants of the earth as have the same latitudes, but opposite longitudes, or live under the same parallel and the same meridian, but in different semicircles of that meridian, or in opposite points of the parallel. These have the same common seasons throughout the year, and the same phenomena of the heavenly bodies; but when it is noon-day with the one, it is midnight with the other, there being twelve hours in an east and west direction. These are found on the globe by the hour-index, or by turning the globe half round, that is, 180 degrees either way.

PERIOSTEUM, or PERIOSTIUM, in anatomy, a nervous vascular membrane, endued with a very quick sense, immediately surrounding, in every part, both the internal and external surfaces of all the bones in the body, excepting only so much of the teeth as stand above the gums, and the peculiar places on the bones, in which the muscles are inserted. It is hence divided into the external and internal periosteum; and where

Peripatetics. it externally furrounds the bones of the skull, it is generally called the *pericranium*. See ANATOMY, n^o 4.

PERIPATETICS, philosophers, followers of Aristotle, and maintainers of the peripatetic philosophy; called also *Aristotelians*. Cicero says, that Plato left two excellent disciples, Xenocrates and Aristotle, who founded two sects, which only differed in name: the former took the appellation of *Academics*, who were those that continued to hold their conferences in the Academy, as Plato had done before; the others, who followed Aristotle, were called *Peripatetics*, from *περιπατῆς*, "I walk;" because they disputed walking in the Lyceum.

Ammonius derives the name Peripatetic from Plato himself, who only taught walking; and adds, that the disciples of Aristotle, and those of Xenocrates, were equally called Peripatetics; the one Peripatetics of the Academy, the other Peripatetics of the Lyceum: but that in time the former quitted the title Peripatetic for that of Academic, on account of the place where they assembled; and the latter retained simply that of Peripatetic. The greatest and best part of Aristotle's philosophy was borrowed from Plato. Serranus asserts, and says he could demonstrate, that there is nothing exquisite in any part of Aristotle's philosophy, dialectics, ethics, politics, physics, or metaphysics, but is found in Plato. And of this opinion are many of the ancient authors, such as Clemens Alexandrinus, &c. Gale attempts to show, that Aristotle borrowed a good deal of his philosophy, both physical, about the first matter, and metaphysical about the first being, his affections, truth, unity, goodness, &c. from the Scriptures; and adds from Clearchus, one of Aristotle's scholars, that he made use of a certain Jew, who assisted him therein.

Aristotle's philosophy preserved itself in *puris naturalibus* for a long time: in the earlier ages of Christianity, the Platonic philosophy was generally preferred; but this did not prevent the doctrine of Aristotle from forcing its way into the Christian church. Towards the end of the fifth century, it rose into great credit; the Platonics interpreting in their schools some of the writings of Aristotle, particularly his dialectics, and recommending them to young persons. This appears to have been the first step to that universal dominion which Aristotle afterwards obtained among the learned, which was at the same time much promoted by the controversies which Origen had occasioned. This father was zealously attached to the Platonic system; and therefore, after his condemnation, many, to avoid the imputation of his errors, and to prevent their being counted among the number of his followers, openly adopted the philosophy of Aristotle. Nor was any philosophy more proper for furnishing those weapons of subtle distinctions and captious sophisms, which were used in the Nestorian, Arian, and Eutychian controversies. About the end of the sixth century, the Aristotelian philosophy, as well as science in general, was almost universally decried; and it was chiefly owing to Boethius, who explained and recommended it, that it obtained a higher degree of credit among the Latins than it had hitherto enjoyed. Towards the end of the seventh century, the Greeks abandoned Plato to the monks, and gave themselves up entirely to the direc-

tion of Aristotle; and in the next century, the Peripatetic philosophy was taught everywhere in their public schools, and propagated in all places with considerable success. John Damascenus very much contributed to its credit and influence, by compiling a concise, plain, and comprehensive view of the doctrines of the Stagirite, for the instruction of the more ignorant, and in a manner adapted to common capacities. Under the patronage of Photius, and the protection of Bardas, the study of philosophy for some time declined, but was revived again about the end of the ninth century. About the middle of the 11th century, a revolution in philosophy commenced in France; when several famous logicians, who followed Aristotle as their guide, took nevertheless the liberty of illustrating and modelling anew his philosophy, and extending it far beyond its ancient limits. In the 12th century, three methods of teaching philosophy were in use by different doctors: the first was the ancient and plain method, which confined its researches to the philosophical notions of Porphyry, and the dialectic system, commonly attributed to St Augustine, and in which were laid down this general rule, that philosophical inquiries were to be limited to a small number of subjects, lest, by their becoming too extensive, religion might suffer by a profane mixture of human subtilty with its divine wisdom. The second method was called the Aristotelian, because it consisted in explications of the works of that philosopher, several of whose books, being translated into Latin, were almost everywhere in the hands of the learned. The third was termed the free method, employed by such as were bold enough to search after truth, in the manner the most adapted to render their inquiries successful, without rejecting the succours of Aristotle and Plato. A reformed system of the Peripatetic philosophy was first introduced into the schools in the university of Paris, from whence it soon spread throughout Europe; and has subsisted in some universities even to this day, under the name of *school philosophy*. The foundation thereof is Aristotle's doctrine, often misunderstood, but oftener misapplied: whence the retainers thereto may be denominated *Reformed Peripatetics*. Out of these have sprung, at various times, several branches; the chief are, the THOMISTS, SCOTISTS, and NOMINALISTS. See these articles.

The Peripatetic system, after having prevailed with great and extensive dominion for many centuries, began rapidly to decline towards the close of the 17th, when the disciples of Ramus attacked it on the one hand, and it had still more formidable adversaries to encounter in Descartes, Gassendi, and Newton. See PHILOSOPHY.

PERIPATON, in antiquity, the name of that walk in the Lyceum where Aristotle taught, and whence the name of Peripatetics given to his followers.

PERIPETIA, in the drama, that part of a tragedy wherein the action is turned, the plot unravelled, and the whole concludes. See CATASTROPHE.

PERIPHERY, in geometry, the circumference of a circle, ellipsis, or any other regular curvilinear figure. See GEOMETRY.

PERIPHRAISIS, circumlocution, formed of *περι* "about," and *φράσις* "I speak," in rhetoric, a circuit or tour of words, much affected by orators, to avoid common and trite manners of expression. The *periphrasis*

Peripatetics
||
Periphrasis

Periploca,
Peri; neu-
mony.

phrasis is of great use on some occasions; and it is often necessary to make things be conceived which are not proper to name. It is sometimes polite to suppress the names, and only intimate or design them. These turns of expression are also particularly serviceable in oratory; for the sublime admitting of no direct citations, there must be a compass taken to insinuate the authors whose authority is borrowed. A periphrasis, by turning round a proper name to make it understood, amplifies and raises the discourse; but care must be taken it be not too much swelled, nor extended *mal à propos*, in which case it becomes flat and languid.— See CIRCUMLOCUTION and ORATORY.

Dictionary
of Plant-
ing, &c.

PERIPOLOCA, Virginian silk, in botany: A genus of the digynia order, belonging to the pentandria class of plants; and in the natural method ranking under the 30th order, *Contortæ*. The nectarium surrounds the genitals, and sends out five filaments. There are five species, four of which are natives of warm climates, and can only be raised there. The fifth, however, is sufficiently hardy for this climate. The periploca is a fine climbing plant, that will wind itself with its ligneous branches about whatever tree, hedge, pale, or pole is near it; and will arise, by the assistance of such support, to the height of above 30 feet; and where no tree or support is at hand to wind about, it will knit or entangle itself together in a most complicated manner. The stalks of the older branches, which are most woody, are covered with a dark brown bark, whilst the younger shoots are more mottled with the different colours of brown and grey, and the ends of the youngest shoots are often of a light green. The stalks are round, and the bark is smooth. The leaves are the greatest ornament to this plant; for they are tolerably large, and of a good shining green colour on their upper surface, and cause a variety by exhibiting their under surface of an hoary cast. Their figure is oblong, or rather more inclined to the shape of a spear, as their ends are pointed, and they stand opposite by pairs on short footstalks. Their flowers afford pleasure to the curious examiner of nature. Each of them singly has a star-like appearance; for though it is composed of one petal only, yet the rim is divided into segments, which expand in such a manner as to form that figure. Their inside is hairy, as is also the nectarium which surrounds the petal. Four or five of the flowers grow together, forming a kind of umbel. They are of a chocolate colour, are small, and will be in blow in July and August, and sometimes in September. In the country where this genus grows naturally, they are succeeded by a long taper pod, with compressed seeds, having down to their tops.

The propagation of this climber is very easy; for if the cuttings are planted in a light moist soil, in the autumn or in the spring, they will readily strike root. Three joints at least should be allowed to each cutting: they should be the bottom of the preceding summer's shoot; and two of the joints should be planted deep in the soil. Another, and a never-failing method, is by layers; for if they are laid down in the ground, or a little soil only loosely thrown over the young preceding summer's shoots, they will strike root at the joints, and be good plants for removing the winter following.

PERIPNEUMONY, *Περιπνευμονία*, formed from *περι* "about," and *πνευμον* "lungs," in medicine, an

inflammation of some part of the thorax, properly of the lungs; attended with an acute fever, and a difficulty of breathing. See MEDICINE, n° 184.

PERIRRHANTERIUM, a vessel of stone or brass which was filled with holy water, and with which all those were sprinkled who were admitted by the ancients to their sacrifices. Beyond this vessel no profane person was allowed to pass. We are told by some, that it was placed in the *Adytum*, or inmost recess of the temple; others say it was placed at the door, which indeed seems to be the most likely opinion. It was used both by Greeks and Romans, and has been evidently borrowed, like many other Pagan ceremonies, by the Church of Rome. The Hebrews also had a vessel for purification.

PERISCII, in geography, the inhabitants of either frigid zone, between the polar circles and the poles, where the sun, when in the summer signs, moves only round about them, without setting; and consequently their shadows in the same day turn to all the points of the horizon.

PERISTALTIC, a vermicular spontaneous motion of the intestines, performed by the contraction of the circular and longitudinal fibres of which the fleshy coats of the intestines are composed; by means whereof the chyle is driven into the orifices of the lacteal veins, and the fæces are protruded towards the anus.

PERISTYLE, in ancient architecture, a building encompassed with a row of columns on the inside.

PERITONÆUM, in anatomy, is a thin, smooth, and lubricous membrane, invelling the whole internal surface of the abdomen, and containing most of the viscera of that part as it were in a bag. See ANATOMY, n° 89.

PERITROCHIUM, in mechanics, denotes a wheel, or circle, concentric with the base of a cylinder, and moveable together with it about its axis. See MECHANICS.

PERJURY, in law, is defined by Sir Edward Coke to be a crime committed when a lawful oath is administered, in some judicial proceeding, to a person who swears wilfully, absolutely, and falsely, in a matter material to the issue or point in question. In ancient times it was in some places punished with death; in others it made the false swearer liable to the punishment due to the crime he had charged the innocent person with; in others a pecuniary mulct was imposed. But though it escaped human, yet it was thought, amongst the ancients in general, that the divine vengeance would most certainly overtake it; and there are many severe inflictions from the hand of God upon record, as monuments of the abhorrence in which this atrocious crime is held by the Deity. The souls of the deceased were supposed to be employed in punishing perjured persons. Even the inanimate creation was thought to take revenge for this crime. The Greeks supposed that no person could swear falsely by Styx without some remarkable punishment; and that no person guilty of perjury could enter the cave of Palæmon at Corinth without being made a memorable example of divine justice. In Sicily, at the temple of the Palici, there were fountains called *Delli*, from which issued boiling water, with flames and balls of fire; and we are told that if any person swore falsely near them, he was instantly struck dumb, blind, lame, or

Perirrhanterium
Perjury

perjury, or dead, or was swallowed up by the waters. But although perjury was thus held in general abhorrence, notwithstanding the credit which was given to such accounts of divine inflictions, it was so much practised by the Greeks, that *Græca fides* became a proverb. Lovers perjuriers, however, were supposed to pass unnoticed, or to be very slightly punished with blackness of the nails, a decayed tooth, or some small diminution of beauty.

The ancient philosophers, however, were so afraid of perjury, that even an oath before a judge was never admitted but for want of other proof. Plato's precept was, "Not to administer an oath wantonly, but on deep grounds, and with the strictest caution." Ulpian gives his opinion thus: "Some are forward to take oaths from a contempt of religion; others, from an extraordinary awe of the Divine Majesty, carry their fear to an unreasonable superstition; so make an equitable decision of a judge necessary." "No man will perjure himself (says Aristotle) who apprehends vengeance from Heaven and disgrace among men." Clinias was so very scrupulous, that rather than take an oath (though lawfully), he suffered the loss of three talents. Perjury, in the time of Philo Judeus, was abominated and capitally punished among the Jews; though since they have much degenerated, having been poisoned with the books of the Talmud, which says, "He who breaks his promissory oath, or any vows he enters into by the year, if he has a mind should be ineffectual and invalid, let him rise the last day of the year, and say, Whatever promises, oaths, and vows I may think fit to make in the year following, let them be null, void, and of no effect." Tract. iii. part 3. of the Talmud, in the treatise *Nedharim*, ch. 4. And the modern Jews use the same artifice, thinking they may then lawfully deceive the Christians. See *Hieron. ex Didis Talmud*, c. 3. and *Magister Joannes de Concor. Legum*, tit. iv. c. 7.

In our law, no notice is taken of any perjury but such as is committed in some court of justice having power to administer an oath; or before some magistrate or proper officer invested with a similar authority, in some proceedings relative to a civil suit or a criminal prosecution: for it esteems all other oaths unnecessary at least, and therefore will not punish the breach of them. For which reason it is much to be questioned, how far any magistrate is justifiable in taking a voluntary affidavit in any extrajudicial matter, as is now too frequent upon every petty occasion; since it is more than possible that, by such idle oaths, a man may frequently, in *foro conscientie*, incur the guilt, and at the same time evade the temporal penalties of perjury. The perjury must also be corrupt (that is, committed *malò animo*), wilful, positive, and absolute; not upon surprise, or the like: it also must be in some point material to the question in dispute; for if it only be in some trifling collateral circumstance, to which no regard is paid, it is no more penal than in the voluntary extrajudicial oaths before mentioned. Subornation of perjury is the offence of procuring another to take such a false oath, as constitutes perjury in the principal. The punishment of perjury and subornation, at common law, has been various. It was anciently death; afterwards banishment, or cutting out the tongue; then forfeiture of goods; and now it is fine and imprisonment, and

never more to be capable of bearing testimony. But the statute 5 Eliz. c. 9. (if the offender be prosecuted thereon) inflicts the penalty of perpetual infamy, and a fine of 40 l. on the suborner; and in default of payment, imprisonment for six months, and to stand with both ears nailed to the pillory. Perjury itself is thereby punished with six months imprisonment, perpetual infamy, and a fine of 20 l. or to have both ears nailed to the pillory. But the prosecution is usually carried on for the offence at common law; especially as, to the penalties before inflicted, the statute 2 Geo. II. c. 25. superadds a power for the court to order the offender to be sent to the house of correction for a term not exceeding seven years, or to be transported for the same period; and makes it felony, without benefit of clergy, to return or escape within the time. It has sometimes been wished, that perjury, at least upon capital accusations whereby another's life has been or might have been destroyed, was also rendered capital, upon a principle of retaliation; as it was universally by the laws of France. And certainly the odiousness of the crime pleads strongly in behalf of the French law. But it is to be considered, that there they admitted witnesses to be heard only on the side of the prosecution, and used the rack to extort a confession from the accused. In such a constitution, therefore, it was necessary to throw the dread of capital punishment into the other scale, in order to keep in awe the witnesses for the crown; on whom alone the prisoner's fate depended: so naturally does one cruel law beget another. But corporal and pecuniary punishments, exile, and perpetual infamy, are more suited to the genius of the English law; where the fact is openly discussed between witnesses on both sides, and the evidence for the crown may be contradicted and disproved by those of the prisoner. Where indeed the death of an innocent person has actually been the consequence of such wilful perjury, it falls within the guilt of deliberate murder, and deserves an equal punishment; which our ancient law in fact inflicted. But the mere attempt to destroy life by other means not being capital, there is no reason that an attempt by perjury should; much less that this crime should, in all judicial cases, be punished with death. For to multiply capital punishments lessens their effect, when applied to crimes of the deepest dye; and, detestable as perjury is, it is not by any means to be compared with some other offences, for which only death can be inflicted; and therefore it seems already (except perhaps in the instance of deliberate murder by perjury) very properly punished by our present law; which has adopted the opinion of Cicero, derived from the law of the twelve tables, *Perjurii pœna divina, exitium; humana, dolus*. See OATH.

PERIWIG. See PERRUKE.

PERIZONIUS (James), a very learned and laborious writer, was born at Dam in 1651. He became professor of history and eloquence at the university of Franeker, when, by his merit and learning, he made that university flourish. However, in 1693, he went to Leyden, where he was made professor of history, eloquence, and the Greek tongue; in which employment he continued till his death, which happened in 1715. He wrote many Disertations, and other learned and curious works, particularly *Origines Belyvnicæ et*

Perjury
||
Perizonius.

Perizzites
||
Permaio.

Ægyptiaca, 2 vols 8vo, &c. But the part of his labours which is the most generally known, and perhaps the most useful, is the notes which he wrote upon *Sancti Minerva*. That work, as published by Perizonius, certainly suggested the idea of Harris's *Hermes*; and we hesitate not to say, that our countryman has made hardly any improvement on the system of his master.

PERIZZITES, the ancient inhabitants of Palestine, mingled with the Canaanites. There is also great probability that they themselves were Canaanites; but having no fixed habitations, sometimes dispersed in one country and sometimes in another, they were for that reason called *Perizzites*, which signifies *scattered* or *dispersed*. *Pharazoth* stands for *hamlets* or *villages*. The *Perizzites* did not inhabit any certain portion of the land of Canaan; there were some of them on both sides the river *Jordan*, in the mountains, and in the plains. In several places of Scripture the Canaanites and *Perizzites* are mentioned as the two chief people of the country. It is said, for example, that in the time of Abraham and Lot the Canaanite and *Perizzite* were in the land (Gen. xiii. 7.) The Israelites of the tribe of Ephraim complained to Joshua that they were too much pent up in their possession (Josh. xvii. 15.): he bid them go, if they pleased, into the mountains of the *Perizzites*, and *Rephaims* or giants, and there clearing the land, to cultivate and inhabit it. Solomon subdued the remains of the Canaanites and *Perizzites* which the children of Israel had not rooted out, and made them tributary to him (1 Kings ix. 20, 21. and 2 Chr. viii. 7.) There is still mention made of the *Perizzites* in the time of Ezra (ix. 1.), after the return from the captivity of Babylon; and several Israelites had married wives from that nation.

PERKIN. See CYDERKIN, and HUSBANDRY, n° 238.

PERMEABLE, a term applied to bodies of so loose a texture as to let something pass through them.

PERMSKI, or PERMIA, a town of the Russian empire, and capital of a province of the same name, seated on the river Kama between the Dwina and the Oby; E. Long. 55. 50. N. Lat. 70. 26. The province is bounded on the north by the Samoiedes, on the west by Ziranian and Ulatka, and on the east by Siberia.

PERMUTATION, in commerce, the same with bartering. In the canon-law, permutation denotes the actual exchange of one benefice for another.

PERNAMBUCO, a province of Brazil, in South America, bounded on the north by Tamera, on the east by the ocean, on the south by Seregippa, and on the west by Tapuyers. It is about 200 miles in length and 150 in breadth. The Dutch became masters of it in 1630, but the Portuguese soon retook it from them. It produces a great quantity of sugar, and the best Brazil wood.

PERNIO, a kibe or chilblain, is a little ulcer, occasioned by cold in the hands, feet, heels, nose, and lips. It will come on when warm parts are too suddenly exposed to cold, or when parts from being too cold are suddenly exposed to a considerable warmth; and has always a tendency to gangrene, in which it frequently terminates. It most commonly attacks

children of a sanguine habit and delicate constitution; and may be prevented or removed by such remedies as invigorate the system, and are capable of removing any tendency to gangrene in the constitution.

PERONÆUS, in anatomy, is an epithet applied to some of the muscles of the perone or fibula. See ANATOMY, *Table of the Muscles*.

PERONES, a sort of high shoes which were worn not only by country people, but by men of ordinary rank at Rome. In the early times of the commonwealth they were worn even by senators; but at last they were disused by persons of figure, and confined to ploughmen and labourers. They were very rudely formed, consisting only of hides undressed, and reaching to the middle of the leg. Virgil mentions the perones as worn by a company of rustic soldiers on one foot only.

PERONNE, a strong town of France, in Picardy, capital of Santerre. It is said never to have been taken, though often besieged. It is seated on the river Somme, in E. Long. 3. 1. N. Lat. 44. 50.

PERORATION, in rhetoric, the epilogue or last part of an oration, wherein what the orator had insisted on through his whole discourse is urged afresh with greater vehemence and passion. The peroration consists of two parts. 1. Recapitulation; wherein the substance of what was diffused throughout the whole speech is collected briefly and cursorily, and summed up with new force and weight. 2. The moving the passions; which is so peculiar to the peroration, that the masters of the art call this part *sedes ædificium*. The passions to be raised are various, according to the various kinds of oration. In a panegyric, love, admiration, emulation, joy, &c. In an invective, hatred, contempt, &c. In a deliberation, hope, confidence, or fear. The qualities required in the peroration are, that it be very vehement and passionate, and that it be short; because, as Cicero observes, tears soon dry up. These qualities were well observed by Cicero, who never had an equal in the management of this part of an orator's province; for peroration was his masterpiece.

"Concerning peroration (says Dr Blair), it is needless to say much, because it must vary so considerably, according to the strain of the preceding discourse, Sometimes the whole pathetic part comes in most properly at the peroration. Sometimes, when the discourse has been entirely argumentative, it is fit to conclude with summing up the arguments, placing them in one view, and leaving the impression of them full and strong on the mind of the audience. For the great rule of a conclusion, and what nature obviously suggests, is, to place that last on which we choose that the strength of our cause should rest.

"In all discourses, it is a matter of importance to hit the precise time of concluding, so as to bring our discourse just to a point; neither ending abruptly and unexpectedly, nor disappointing the expectation of the hearers when they look for the close, and continuing to hover round and round the conclusion till they become heartily tired of us. We should endeavour to go off with a good grace; not to end with a languishing and drawling sentence, but to close with dignity and spirit, that we may leave the minds of the hearers

warm

warm, and diffuses them with a favourable impression of the subject and of the speaker."

PÉROTIS, in botany: A genus of the digynia order, belonging to the triandria class of plants; and in the natural method ranking under the 4th order, *Graminea*. There is no calyx: the corolla consists of a bilabiate gluma; the valve rare oblong, acute, somewhat unequal, and to meatus in a sharp beard: it has three capillary stamina; the anthers numerous; the style capillary, and shorter than the corolla; the stigma feathery and divaricate. The corda serves as a perianthium, inclosing a single seed of an oblong linear shape. Of this there is only one species; viz. *plumalis*, a native of America, and lately introduced into Kew Garden.

PERPENDICULAR, in geometry, a line falling directly on another line, so as to make equal angles on each side. See GEOMETRY.

PERPETUAL, something that endures always, or lasts for ever.

Perpetuum Motum. See MOVEMENT.

PERPIGNAN, a considerable town of Roussillon, in France, with a strong citadel, an university, and a bishop's see. It is seated on the river Tet; over which there is an handsome bridge, partly in a plain, and partly on a hill. E. Long. 6. 43. N. Lat. 43. 18.

PERQUISITE, in a general sense, something gained by a place over and above the settled wages.

PÉRIURTE, in law, is any thing gotten by a man's own industry, or purchased with his money; in contradistinction to what descends to him from his father or other ancestor.

PERRAULT (Claude), the son of an advocate in parliament, was born at Paris in 1613; and was bred a physician, though he never practised but among his relations, friends, and the poor. He discovered early a particular taste for the sciences and fine arts; of which he acquired a consummate knowledge without the assistance of a master: he excelled in architecture, painting, sculpture, mathematics, physics, and all those arts that relate to designing and mechanics. The entrance into the Louvre, which was designed by him, is, according to the judgment of Voltaire, one of the most august monuments of architecture in the world. M. Colbert put him upon translating Vitruvius into French, which he performed, and published it in 1673, folio, with figures from his own drawings; which are said to have been more exactly finished than the plates themselves. When the academy of sciences was established, he was one of its first members, and was chiefly depended on for mechanics and natural philosophy. His works are, *Discours pour servir à l'histoire naturelle des animaux*, folio, 1676, with figures; *Les arts de Paris*, 4 vols 12mo, 1688; *Journal des plus beaux ouvrages de nouvelle invention*, 4to, 1700, &c. He died in 1688.

PERRAULT (Charles), the brother of Claude, was born at Paris in 1626, with as great a genius for art, and a greater for letters, than his brother. Colbert chose him first clerk of the buildings, of which he was superintendent, and afterward made him comptroller-general of the finances under him. He was one of the first members of the academy of the belles lettres and inscriptions, and was received into the French academy in 1671. His poem, *La Pomme*, printed in 1686,

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was universally admired: that entitled *La fable de Louis le Grand*, in which he exalted the modern authors above the ancient, was a prelude to a war with all the learned. After he had disengaged himself from this contest, he applied himself to draw up eulogies of several great men of the 17th century, with their portraits, of which he has collected 102. There are other esteemed works of Perrault.—Besides these there were two other brothers, *Pierre* and *Nicholas*, who made themselves known in the literary world.

PERRON (James Davy Du), a cardinal distinguished by his abilities and learning, was born in the canton of Bern in 1656. He was educated by Julian Davy, his father, a very learned Calvinist, who taught him Latin and the mathematics; after which, he by himself became acquainted with the Greek and Hebrew, philosophy, and the poets. Philip Desportes, abbot of Tyron, made him known to Henry III. king of France, who conceived a great esteem for him. Some time after, Du Perron abjured Calvinism, and afterwards embraced the ecclesiastical function; and having given great proofs of his wit and learning, he was chosen to pronounce the funeral oration of Mary queen of Scots. After the murder of Henry III. he retired to the house of Cardinal de Bourbon, and took great pains in bringing back the Protestants to the church of Rome. Among others, he gained over Henry Spontanus, afterwards bishop of Pamiers. He also chiefly contributed to engage Henry IV. to change his religion; and that prince sent him to negotiate his reconciliation to the holy see, in which he succeeded. Du Perron was consecrated bishop of Evreux while he resided at Rome. On his return to France, he wrote, preached, and disputed against the reformed; particularly against Du Plessis Mornay, with whom he had a public conference in the presence of the king at Fontainebleau. He was made cardinal in 1604 by pope Clement VIII. at the solicitation of Henry IV. who afterwards nominated him to the archbishopric of Sens. The king at length sent him to Rome with Cardinal Joyeuse, in order to terminate the disputes which had arisen between Paul V. and the Venetians. It is said that this pope had such an high opinion of the address of the cardinal Du Perron, that he used to say, "I let us pray to God to inspire the cardinal Du Perron, for he will persuade us to do whatever he pleases." After the death of Henry IV. he retired into the country, where he put the last hand to his works; and, setting up a printing house, corrected every sheet himself. He died at Paris in 1618. His works were collected after his death, and published at Paris in 3 vols folio.

PERROT (Nicholas), Sieur d'Alincourt, one of the first geniuses of his age, was born at Châlons in 1626. After studying philosophy about three years, he was sent to Paris to follow the law. At eighteen years of age he was admitted advocate of parliament, and frequented the bar; but he soon conceived a distaste for it, and therefore discontinued his practice. This disposed him to a more liberal education, but whose account he recovered by quitting the Protestant religion. He could not, however, be prevailed upon to take orders in the Romish church; and some years after, he had a desire to return to the religion he had a just. But, that he might not do any thing rashly, he resolved to study philosophy and divinity. For that purpose he

Perruke.

chose for his master Mr Stuart a Scotsman and Lutheran, a man of great learning. Almost three years he spent in the most assiduous study; and then set out from Paris to Champagne, where he abjured the Roman Catholic, and once more embraced the Protestant religion. In 1637 he was admitted a member of the French academy; a little after which he undertook a translation of Tacitus. Whilst he was engaged in that laborious task, he retired to his small estate of Ablancourt, and lived there till his death in 1664. He was a man of fine understanding, of great piety and integrity, and of universal learning. Moreri has given a catalogue of his works, the greatest part of which consist of translations, which seemed rather originals.

PERRUKE, *PERUKE*, or *Periwig*, was anciently a name for a long head of natural hair; such, particularly, as there was care taken in the adjusting and trimming of. Menage derives the word rather fancifully from the Latin *pilus* "hair." It is derived, according to this critic, thus, *pilus*, *pelus*, *pelutus*, *peluticus*, *peluticus*, *peruticus*, *peruca*, *perruque*. The Latins called it *coma*; whence part of Gaul took the denomination of *Gallia Comata*, from the long hair which the inhabitants wore as a sign of freedom. An ancient author says, that Absalom's perruke weighed 200 shekels.

The word is now used for a set of false hair, curled, buckled, and sewed together on a frame or cawl; anciently called *capillamentum* or "false perruke." It is doubted whether or not the use of perrukes of this kind was known among the ancients. It is true, they used false hair: Martial and Juvenal make merry with the women of their time, for making themselves look young with their borrowed hair; with the men who changed their colours according to the seasons; and with the dotards, who hoped to deceive the Destinies by their white hair. But these seem to have scarce had any thing in common with our perrukes; and were at best only composed of hair painted, and glued together. Nothing can be more ridiculous than the description Lampridius gives of the emperor Commodus's perruke: it was powdered with scrapings of gold, and oiled (if we may use the expression) with glutinous perfumes for the powder to hang by. In effect, the use of perrukes, at least in their present mode, is not much more than 160 years old; the year 1629 is reckoned the epocha of long perrukes, at which time they began to appear in Paris; from whence they spread by degrees through the rest of Europe. At first it was reputed a scandal for young people to wear them, because the loss of their hair at that age was attributed to a disease the very name whereof is a reproach; but at length the mode prevailed over the scruple, and persons of all ages and conditions have worn them, foregoing without any necessity the conveniences of their natural hair. It was, however, some time before the ecclesiastics came into the fashion: the first who assumed the perruke were some of the French clergy, in the year 1660; nor is the practice yet well authorized. Cardinal Grimaldi in 1684, and the bishop of Lavaur in 1688, prohibited the use of the perruke to all priests without a dispensation or necessity. M. Thiers has an express treatise, to prove the perruke indecent in an ecclesiastic, and directly contrary to the decrees and canons of councils. A priest's head, embellished

with artificial hair curiously adjusted, he esteems a monster in the church, nor can he conceive any thing so scandalous as an abbot with a florid countenance, heightened with a well-curled perruke.

PERRY (Captain John), was a famous engineer, who resided long in Russia, having been recommended to the czar Peter while in England, as a person capable of serving him on a variety of occasions relating to his new design of establishing a fleet, making his rivers navigable, &c. His salary in this service was 300 l. per annum, besides travelling expences and subsistence money on whatever service he should be employed, together with a further reward to his satisfaction at the conclusion of any work he should finish. After some conversation with the czar himself, particularly respecting a communication between the rivers Volga and Don, he was employed on that work for three summers successively; but not being well supplied with men, partly on account of the ill success of the czar's arms against the Swedes at the battle of Narva, and partly by the discouragement of the governor of Astracan, he was ordered at the end of 1707 to stop, and next year was employed in refitting the ships at Veronise, and 1709 in making the river of that name navigable; but after repeated disappointments, and a variety of fruitless applications for his salary, he at last quitted the kingdom, under the protection of Mr Whitworth, the English ambassador, in 1712: (See his narrative in the Preface to *The State of Russia*). In 1721 he was employed in stopping with success the breach at Dagenham, in which several other undertakers had failed; and the same year about the harbour at Dublin, to the objections against which he then published an Answer. He was author of *The State of Russia*, 1716, 8vo, and *An Account of the stopping of Dagenham Breach*, 1721, 8vo; and died Feb. 11. 1733.

PERRY, the name of a very pleasant and wholesome liquor extracted from pears, in the same manner as cyder is from apples. See the article *CYDER*; and *HUSBANDRY*, n° 227—238.

The best pears for perry, or at least the sorts which have been hitherto deemed the fittest for making this liquor, are so excessively tart and harsh, that no mortal can think of eating them as fruit; for even hungry swine will not eat them, nay hardly so much as smell them. Of these the Bosbury pear, the Barend pear, and the horse pear, are the most esteemed for perry in Worcestershire, and the squash pear, as it is called, in Gloucestershire; in both which counties, as well as in some of the adjacent parts, they are planted in the hedge-rows and most common fields. There is this advantage attending pear-trees, that they will thrive on land where apples will not so much as live, and that some of them grow to such a size, that a single pear tree, particularly of the Bosbury and the squash kind, has frequently been known to yield, in one season, from one to four hogsheds of perry. The Bosbury pear is thought to yield the most lasting and most vinous liquor. The John pear, the Harpary pear, the Drake pear, the Mary pear, the Lullum pear, and several others of the hardest kinds, are esteemed the best for perry, but the redder or more tawney they are, the more they are preferred. Pears, as well as apples, should be full ripe before they are ground.

Perry
||
Persees.

Dr Beale, in his general advertisements concerning cyder, subjoined to Mr Evelyn's Pomona, disapproves of Palladius's saying, that perry will keep during the winter, but that it turns sour as soon as the weather begins to be warm; and gives, as his reasons for being of a contrary opinion, that he had himself tasted at the end of summer, a very brisk, lively, and vinous liquor, made of horse pears; that he had often tried the juice of the Bosbury pear, and found it both pleasanter and richer the second year, and still more so the third, though kept only in common hogheads, and in but indifferent cellars, without being bottled; and that a very honest, worthy, and ingenious gentleman in his neighbourhood, assured him, as of his own experience, that it will keep a great while, and grow much the stronger for keeping, if put into a good cellar and managed with due care. He imputes Palladius's error to his possibly speaking of common eatable pears, and to the perry's having been made in a very hot country; but he would have ascribed it to a more real cause, perhaps, had he pointed out the want of a thorough regular fermentation, to which it appears plainly that the ancients were entire strangers; for all their vinous liquors were medicated by boiling before they were laid up in order to be kept.

PERSECUTION, is any pain or affliction which a person designedly inflicts upon another; and in a more restrained sense, the sufferings of Christians on account of their religion.

Historians usually reckon ten general persecutions, the first of which was under the emperor Nero, 31 years after our Lord's ascension; when that emperor having set fire to the city of Rome, threw the odium of that execrable action on the Christians, who under that pretence were wrapped up in the skins of wild beasts, and worried and devoured by dogs; others were crucified, and others burnt alive. The second was under Domitian, in the year 95. In this persecution St John the apostle was sent to the isle of Patmos, in order to be employed in digging in the mines. The third began in the third year of Trajan, in the year 100, and was carried on with great violence for several years. The fourth was under Antoninus the philosopher, when the Christians were banished from their houses, forbidden to show their heads, reproached, beaten, hurried from place to place, plundered, imprisoned, and stoned. The fifth began in the year 197, under the emperor Severus. The sixth began with the reign of the emperor Maximinus in 235. The seventh, which was the most dreadful persecution that had ever been known in the church, began in the year 250, in the reign of the emperor Decius, when the Christians were in all places driven from their habitations, stripped of their estates, tormented with racks, &c. The eighth began in the year 257, in the fourth year of the reign of the emperor Valerian. The ninth was under the emperor Aurelian, A. D. 274; but this was very inconsiderable; and the tenth began in the 19th year of Dioclesian, A. D. 303. In this dreadful persecution, which lasted ten years, houses filled with Christians were set on fire, and whole droves were tied together with ropes and thrown into the sea. See TOLERATION.

PERSEES, the descendants of a colony of ancient Persians, who took refuge at Bombay, Surat, and in

the vicinity of those cities, when their own country was conquered 1100 years ago by the Mahometan Arabs. They are a gentle, quiet, and industrious people, loved by the Hindoos, and living in great harmony among themselves. The consequence is, that they multiply exceedingly, whilst their countrymen in the province of Kerman are visibly diminishing under the yoke of the Mahometan Persians. Of the manners and customs of this amiable race, we have the following account in Heron's elegant translation of Niebuhr's Travels.

"The Persees (says he) make common contributions for the aid of their poor, and suffer none of their number to ask alms from people of a different religion. They are equally ready to employ their money and credit to screen a brother of their fraternity from the abuses of justice. When a Persee behaves ill, he is expelled from their communion. They apply to trade, and exercise all sorts of professions.

"The Persees have as little knowledge of circumcision as the Hindoos. Among them, a man marries only one wife, nor ever takes a second, unless when the first happens to be barren. They give their children in marriage at six years of age; but the young couple continue to live separate, in the houses of their parents, till they attain the age of puberty. Their dress is the same as that of the Hindoos, except that they wear under each ear a tuft of hair, like the modern Persians. They are much addicted to astrology, altho' very little skilled in astronomy.

"They retain the singular custom of exposing their dead to be eaten by birds of prey, instead of interring or burning them. I saw (continues our author) on a hill at Bombay a round tower, covered with planks of wood, on which the Persees lay out their dead bodies. When the flesh is devoured, they remove the bones into two chambers at the bottom of the tower.

"The Persees, followers of the religion of Zerdust or Zoroaster, adore one God only, eternal and almighty. They pay, however, a certain worship to the sun, the moon, the stars, and to fire, as visible images of the invisible divinity. Their veneration for the element of fire induces them to keep a sacred fire constantly burning, which they feed with odoriferous wood, both in the temples and in the houses of private persons, who are in easy circumstances. In one of their temples at Bombay, I saw a fire which had burnt unextinguished for two centuries. They never blow out a light, lest their breath should soil the purity of the fire. See POLYTHEISM.

"The religion of the Persees enjoins purifications as strictly as that of the Hindoos. The disciples of Zerdust are not, however, obliged to abstain from animal food. They have accustomed themselves to refrain from the flesh of the ox, because their ancestors promised the Indian prince who received them into his dominions never to kill horned cattle. His promise they continue to observe under the dominion of Christians and Mahometans. The horse is by them considered as the most impure of all animals, and regarded with extreme aversion.

"Their festivals, denominated *Ghumbars*, which return frequently, and last upon each occasion five days, are all commemorations of some part of the work of creation. They celebrate them not with splendour, or

Persees.

Persepolis with any particular ornaments, but only distinguished by better than the five others, perform fore parts of devotion in their houses, and visit their friends."

The Persians were still lately but very little known: the ancients told us of them, but not of them, and what they say is lost or distorted by posterity. On this account Mr. Hume, who thought the subject both curious and interesting, about the end of last century, attempted a deeper investigation, of a subject which till then had been but very little attended to. He applied to the works of Arabian and Persian authors, from whom, and from the relations of travellers, together with a variety of letters from persons in India, he compiled his celebrated work on the religion of the Persians. Other accounts have been given by different men, and ancient put information in their way. But the most distinguished is by M. Anquetil in Persia, who undertook a voyage to discover and translate the works attributed to Zoroaster. Of this voyage he drew up an account himself, and read it before the Royal Academy of Sciences at Paris in May 1761. A translation of it was made and published in the Gentleman's Magazine for 1762, to which we refer our readers. The account begins at p. 373, and is concluded at p. 614. Remarks were afterwards made on Du Perren's account by a Mr Yates. See the same Magazine for 1766, p. 529.

PERSEPOLIS, formerly the capital of Persia, situated in N. Lat. 30. 30. E. Long. 84. now in ruins, but remarkable for the most magnificent remains of a palace or temple that are to be found throughout the world.—This city stood in one of the finest plains in Persia, being 18 or 19 leagues in length, and in some places two, in some four, and in others six leagues in breadth. It is watered by the great river Araxes, now Bendemir, and by a multitude of rivulets besides. Within the compass of this plain, there are between 1000 and 1500 villages, without reckoning those in the mountains, all adorned with pleasant gardens, and planted with shady trees. The entrance of this plain on the west side has received as much grandeur from nature, as the city it covers could do from industry or art. It consists of a range of mountains steep and high, four leagues in length, and about two miles broad, forming two flat banks, with a rising terrace in the middle, the summit of which is perfectly plain and even, all of native rock. In this there are such openings, and the terraces are so fine and so even, that one would be tempted to think the whole the work of art, if the great extent, and prodigious elevation thereof, did not convince one that it is a wonder too great for aught but nature to produce. Undoubtedly these banks were the very place where the advanced guards from Persepolis took post, and from which Alexander found it so difficult to dislodge them. One cannot from hence descry the ruins of the city, because the banks are too high to be overlooked; but one can perceive on every side the ruins of walls and of edifices, which heretofore adorned the range of mountains of which we are speaking. On the west and on the north this city is defended in the like manner: so that, considering the height and evenness of these banks, one may safely say, that there is not in the world a place so fortified by nature.

The mountain Rahmut, in the form of an amphitheatre, surmounts the palace, which is one of the noblest and most beautiful pieces of architecture remaining of all antiquity. Authors and travellers have been exceedingly minute in their descriptions of those ruins; and yet none of them have expressed themselves so distinctly from others, that, but they not agreed with respect to the latitude and longitude of the place, one would be tempted to suspect that they had visited different ruins. These ruins have been described by Guefias de Silva Figueroa, Pietro de la Valle, Chardin, Le Brun, and Mr. Francklin. We shall adopt the latest description, as being exceedingly distinct, and given by a traveller intelligent and unflinching. The ascent to the columns is by a grand staircase of blue stone containing 104 steps.

"The first object that strikes the beholder on his entrance, are two portals of stone, about 10 feet in height each; the sides are embellished with two figures of an immense size, dressed out with a profusion of bead work, and, contrary to the usual method, they are represented standing. On the sides above are inscriptions in an ancient character, the meaning of which no one hitherto has been able to decipher.

"At a small distance from these portals you ascend another flight of steps, which lead to the grand hall of columns. The sides of this staircase are ornamented with a variety of figures in basso relievo; most of them have vessels in their hands: here and there a camel appears, and at other times a kind of triumphal car, made after the Roman fashion; besides these are several led horses, oxen, and rams, that at times intervene and diversify the procession. At the head of the staircase is another basso relievo, representing a lion seizing a bull; and close to this are other inscriptions in ancient characters. On getting to the top of this staircase, you enter what was formerly a most magnificent hall; the natives have given this the name of *chebul minâr*, or forty pillars; and though this name is often used to express the whole of the building, it is more particularly appropriated to this part of it. Although a vast number of ages have elapsed since the foundation, 15 of the columns yet remain entire; they are from 70 to 80 feet in height, and are masterly pieces of masonry: their pedestals are curiously worked, and appear little injured by the hand of time. The shafts are enclosed up to the top, and the capitals are adorned with a profusion of fretwork.

"From this hall you proceed along eastward, until you arrive at the remains of a large square building, to which you enter through a door of granite. Most of the doors and windows of this apartment are still standing; they are of black marble, and polished like a mirror: on the sides of the doors, at the entrance, are bas-reliefs of two figures at full length; they represent a man in the attitude of stabbing a goat: with one hand he seizes hold of the animal by the horn, and thrusts a dagger into his belly with the other; one of the goat's feet rests upon the breast of the man, and the other upon his right arm. This device is common throughout the palace. Over another door of the same apartment is a representation of two men at full length; behind them stands a domestic holding a spread umbrella: they are supported by large round shafts, appear

perse to be in years, have long beards, and a profusion of hair upon their heads.

"At the south-west entrance of this apartment are two large pillars of stone, upon which are carved four figures; they are dressed in long garments, and hold in their hands spears 10 feet in length. At this entrance also the remains of a staircase of blue stone are still visible. Vast numbers of broken pieces of pillars, shafts, and capitals, are scattered over a considerable extent of ground, some of them of such enormous size, that it is wonderful to think how they could have been brought whole, and set up together. Indeed, every remains of these noble ruins indicate their former grandeur and magnificence, truly worthy of being the residence of a great and powerful monarch."

These noble ruins are now the shelter of beasts and birds of prey. Besides the inscription above-mentioned, there are others in Arabic, Persian, and Greek. Dr Hyde observes, that the inscriptions are very rude and unartificial; and that some, if not all of them, are in praise of Alexander the Great; and therefore are later than that conqueror. See the article RUINS.

PERSEVERANCE, in theology, a continuance in a state of grace to a state of glory.

About this subject there has been much controversy in the Christian church. All divines, except Unitarians, admit, that no man can ever be in a state of grace without the co-operation of the spirit of God; but the Calvinists and Arminians differ widely as to the nature of this co-operation. The former, at least such as call themselves the true disciples of Calvin, believe, that those who are once under the influence of divine grace can never fall totally from it, or die in mortal sin. The Arminians, on the other hand, contend, that the whole of this life is a state of probation; that without the grace of God we can do nothing that is good; that the Holy Spirit assists, but does not overpower, our natural faculties; and that a man, at any period of his life, may resist, grieve, and even quench the spirit. See THEOLOGY.

PERSEUS was the most ancient of all the Greek heroes. He founded the city of Mycenæ, of which he became afterwards king, and where he and his posterity reigned for 120 years. He flourished, according to most chronologists, 1348 B. C. but, according to Sir Isaac Newton, only 1028.

PERSEUS, in astronomy. See there, n° 406.

PERSIA, a most ancient and celebrated empire of Asia, extending in length from the mouth of the river Araxes to that of the river Indus, about 1540 of our miles, and in breadth from the river Oxus, to the Persian gulph, about 1080 of the same miles. It is bounded on the north by the Caspian Sea, the river Oxus, and mount Caucasus; on the east, by the river Indus and the dominions of the Great Mogul; on the south, by the Persian gulph and the Indian ocean; and on the west, by the dominions of the Grand Signior.

We learn from Sir William Jones, the illustrious president of the Asiatic Society, that Persia is the name of only one province of this extensive empire, which by the present natives, and all the learned *Musulmans* who reside in the British territories in India, is called *Irân*. It has been a practice not uncommon in all ages to denominate the whole of a country from

that part of it with which we are best acquainted; and hence have the Europeans agreed to call Iran by the name of that province of which Shirauz is the capital: See SHIRAUZ. The same learned writer is confident that Iran, or Persia in its largest extent, comprehended within its outline the Lower Asia, which, says he, was unquestionably a part of the *Perſian*, if not of the old Assyrian empire. "Thus may we look on Iran as the noblest peninsula on this habitable globe; and if M. Bailly had fixed on it as the *Atlantis* of PLATO, he might have supported his opinion with far stronger arguments than any that he has adduced in favour of *Nova Zembla*. If, indeed, the account of the Atlantis be not purely an Egyptian fable, I should be more inclined, says Sir William, to place them in Iran than in any region with which I am acquainted."

The most ancient name, however, of this country was that of *Eam*, or, as some write it, *Æam*, from names of Elam the son of Shem, from whom its first inhabitants are descended. Herodotus calls its inhabitants *Cepheus*; and in very ancient times the people are said to have called themselves *Artai*, and the country where they dwelt *Artia*. In the books of Daniel, Esdras, &c. it is called by the names of *Par*, *Pharas*, or *Fars*, whence the modern name of *Perſia*; but whence those names have been derived, is now uncertain.

That Persia was originally peopled by Elam the son of Shem, has been very generally admitted; but respecting the truth is, that of the ancient history of this distinguished empire very little is perfectly known. For this ignorance, which at first seems strange, satisfactory reasons may easily be assigned; of which the principal are the superficial knowledge of the *Greeks* and *Jews*, and the loss of Persian archives or historical compositions. "That the Grecian writers before XENOPHON had no acquaintance with *Perſia*, and that their accounts of it are wholly fabulous, is a paradox too extravagant to be seriously mentioned; but (says Sir William Jones) their connection with it in war or peace had been generally confined to bordering kingdoms under tributary princes; and the first *Perſian* emperor, whose life and character they seem to have known with tolerable accuracy, was the great CYRUS." Our learned author, however, is so far from considering Cyrus as the first Persian monarch, that he thinks it evident a powerful monarchy had subsisted in Iran for ages before the accession of that hero; that this monarchy was called the *Mahabédian* dynasty; and that it was in fact the oldest monarchy in the world. The evidence upon which the president rests this opinion, is the work of a Mahometan traveler, compiled from the books of such Persians as fled from their country upon the innovation in religion made by Zoroaster; and if these books, of which a few still remain, be genuine, and the Mahometan a faithful compiler, facts of which Sir William has not the smallest doubt, the evidence is certainly sufficient to bear the superstructure which he has raised upon it.

If the Persian monarchy was thus ancient, it is natural to suppose that Persia or Iran was the original seat of the human race, whence colonies were sent out or emigrated of themselves to people the rest of the habitable globe. This supposition is actually made by our ingenious author, who strongly confirms it by re-

Persia.

marks on the most ancient language of Persia, which he shows to have been the parent of the *Sanscrit*, as well as of the Greek, Latin, and Gothic (see *PHILOLOGY*). He therefore holds, as a proposition firmly established, "that *Iran* or Persia, in its largest sense, was the true centre of population, of knowledge, of languages, and of arts; which instead of travelling westward only, as it has been fancifully supposed, or eastward, as might with equal reason have been asserted, were expanded in all directions to all the regions of the world." He thinks it is from good authority that the Saxon Chronicle brings the first inhabitants of Britain from Armenia; that the Goths have been concluded to come from Persia; and that both the Irish and old Britons have been supposed to have proceeded from the borders of the Caspian: for all these places were comprehended within the ancient *Iran*.

6 Accounts of the birth, &c. of Cyrus.
Of this first Persian monarchy we have no historical accounts; and must therefore, after having thus mentioned it, descend at once to the era of Cyrus. This prince is celebrated both by sacred and profane historians; but the latter are at no small variance concerning his birth and accession to the throne. According to Herodotus, Astyages, the last king of the Medes, being warned in a dream, that the son who was to be born of his daughter Mandane, should one day be lord of Asia, resolved to marry her, not to a Mede, but to a Persian. Accordingly he chose for her husband one Cambyses, a man of a peaceable disposition, and of no very high station. However, about a year after they were married, Astyages was frightened by another dream, which made him resolve to dispatch the infant as soon as it should be born. Hereupon the king sent for his daughter, and put her under confinement, where she was soon after delivered of a son. The infant was committed to the care of one Harpagus, with strict orders to destroy it in what manner he thought proper. But he, having acquainted his wife with the command he had received, by her advice gave it to a shepherd, desiring him to let it perish by exposing it. But the shepherd, out of compassion, exposed a still-born child which his wife happened to be then delivered of, and brought up the son of Mandane as his own, giving him the name of CYRUS.

When the young prince had attained the age of ten years, as he was one day at play with other children of the same age, he was chosen king by his companions; and having, in virtue of that dignity, divided them into several orders and classes, the son of Artembares, a lord of eminent dignity among the Medes, refused to obey his orders; whereupon Cyrus caused him to be seized, and whipped very severely. The boy ran crying to his father; and he immediately hastened to the king's palace, loudly complaining of the affront his son had received from the son of a slave, and intreating Astyages to revenge, by some exemplary punishment, the indignity offered to him and his family. Astyages, commanding both the herdsman and his son to be brought before him, asked the latter, how he, who was the son of so mean a man, had dared to abuse the son of one of the chief lords of the kingdom? Cyrus replied, that he had done no more than he had a right to do; for the boys of the neighbourhood having chosen him king, because they thought him most worthy of that dignity, and performed what he, vested with

that character, had commanded, the son of Artembares alone had slighted his orders, and for his disobedience had suffered the punishment he deserved. In the course of this conversation Astyages happening to recollect, that his grandson, whom he had ordered to be destroyed, would have been about the same age with Cyrus, began to question the shepherd concerning his supposed son, and at last obtained from him a confession of the whole truth.

Astyages having now discovered Cyrus to be his grandson, sent for Harpagus, who also confessed that he had not seen Mandane's son destroyed, but had given him to the shepherd; at which Astyages was so much incensed, that, having invited Harpagus to an entertainment, he caused him to be served with the flesh of his own son. When he had done, the king asked him whether he liked his viands; and Harpagus answering, that he had never tasted any thing more delicious, the officers appointed for that purpose brought in a basket, containing the head, hands, and feet of his son, desiring him to uncover the basket, and take what he liked best. He did as they desired, and beheld the mangled remains of his only child without betraying the least concern, so great was the command which he had over his passions. The king then asked him, whether he knew with what kind of meat he had been entertained. Harpagus replied, that he knew very well, and was always pleased with what his sovereign thought fit to ordain; and having thus replied, with a surprising temper he collected the mangled parts of his innocent son, and went home.

Astyages having thus vented his rage on Harpagus, began next to consult what he should do with Cyrus. The magi, however, eased him of his fears with regard to him, by assuring him, that as the boy had been once chosen king by his companions, the dream had been already verified, and that Cyrus never would reign in any other sense. The king, being well pleased with this answer, called Cyrus, and, owning how much he had been wanting in the affection which he ought to have had towards him, desired him to prepare for a journey into Persia, where he would find his father and mother in circumstances very different from those of the poor shepherd and his wife with whom he had hitherto lived. Cyrus, on his arrival at his father's house, was received with the greatest joy. When he grew up, he soon became popular on account of his extraordinary parts; till at last his friendship was courted by Harpagus, who had never forgot the cruel treatment he received from Astyages. By his means a conspiracy was formed against Astyages; who being overthrown in two successive engagements, was taken prisoner and confined for life.

The account given by Xenophon of the rise of Cyrus is much more consonant to Scripture; for he tells us, that Babylon was conquered by the united forces of the Medes and Persians. According to him, Cyrus was the son of Cambyses king of the Medes, and Mandane the daughter of Astyages king of Persia. He was born a year after his uncle Cyaxares, the brother of Mandane. He lived till the age of twelve with his parents in Persia, being educated after the manner of the country, and inured to fatigues and military exercises. At this age he was taken to the court of Astyages, where he resided four years; when the re-

Asia. **volt** of the Medes and Persians from the Babylonians happened, and which ended in the destruction of the Babylonish empire, as related under the article **BA-
BYLON.**

7 war the Asia. While Cyrus was employed in the Babylonish war, before he attacked the metropolis itself, he reduced all the nations of Asia Minor. The most formidable of these were the Lydians, whose king Cræsus assembled a very numerous army, composed of all the other nations in that part of Asia, as well as of Egyptians, Greeks, and Thracians. Cyrus being informed of these vast preparations, augmented his forces to 196,000 men, and with them advanced against the enemy, who were assembled near the river Pactolus. After long marches, he came up with them at Thymbra, not far from Sardis, the capital of Lydia. Besides the horse and foot, which amounted to 196,000, as already observed, Cyrus had 300 chariots armed with scythes, each chariot drawn by four horses abreast, covered with trappings that were proof against all sorts of missile weapons: he had likewise a great number of chariots of a larger size, upon each of which was placed a tower about 18 or 20 feet high, and in each tower were lodged 20 archers. These towers were drawn by 16 oxen yoked abreast. There was moreover a considerable number of camels, each mounted by two Arabian archers, the one looking towards the head, and the other towards the hinder part of the camel. The army of Cræsus consisted of 420,000 men. The Egyptians, who alone were 120,000 in number, being the main strength of the army, were placed in the centre. Both armies were drawn up in an immense plain, which gave room for the extending of the wings on either side; and the design of Cræsus, upon which alone he founded his hopes of victory, was to surround and hem in the enemy's army.

battle sym. When the two armies were in sight of each other, Cræsus, observing how much his front exceeded that of Cyrus, made the centre halt, but commanded the two wings to advance, with a design to inclose the Persian army, and begin the attack on both sides at once. When the two detached bodies of the Lydian forces were sufficiently extended, Cræsus gave the signal to the main body, which marched up to the front of the Persian army, while the two wings attacked them in flank; so that Cyrus's army was hemmed in on all sides, and, as Xenophon expresses it, was inclosed like a small square drawn within a great one. This motion, however, did not at all alarm the Persian commander; but, giving his troops the signal to face about, he attacked in flank those forces that were going to fall upon his rear so vigorously, that he put them into great disorder. At the same time a squadron of camels was made to advance against the enemy's other wing, which consisted mostly of cavalry. The horses were so frightened at the approach of these animals, that most of them threw their riders, and trod them under foot; which occasioned great confusion. Then Artageses, an officer of great valour and experience, at the head of a small body of horse, charged them so briskly, that they could never afterwards rally; and at the same time the chariots, armed with scythes, being driven in among them, they were entirely routed. Both the enemy's wings being thus put to flight, Cyrus commanded his chief favourite Abradates to

fall upon the centre with the large chariots above-mentioned. The first ranks, consisting mostly of Lydians, not being able to stand so violent a charge, immediately gave way; but the Egyptians, being covered with their bucklers, and marching so close that the chariots had not room to penetrate their ranks, a great slaughter of the Persians ensued. Abradates himself was killed, his chariot overturned, and the greatest part of his men were cut in pieces. Upon his death, the Egyptians, advancing boldly, obliged the Persian infantry to give way, and drove them back quite to their engines. There they met with a new shower of darts and javelins from their machines; and at the same time the Persian rear advancing sword in hand, obliged their spearmen and archers to return to the charge. In the mean time Cyrus, having put to flight both the horse and foot on the left of the Egyptians, pushed on to the centre, where he had the misfortune to find his Persians again giving ground; and judging that the only way to stop the Egyptians, who were pursuing them, would be to attack them in the rear, he did so; and at the same time the Persian cavalry coming up to his assistance, the fight was renewed with great slaughter on both sides. Cyrus himself was in great danger; for his horse being killed under him, he fell among the midst of his enemies: but the Persians, alarmed at the danger of their general, threw themselves headlong on their opponents, rescued him, and made a terrible slaughter; till at last Cyrus, admiring the valour of the Egyptians, offered them honourable conditions: letting them know at the same time, that all their allies had abandoned them. They accepted the terms offered them; and having agreed with Cyrus that they should not be obliged to carry arms against Cræsus, they engaged in the service of the conqueror, and continued faithful to him ever after.

The next morning Cyrus advanced towards Sardis, Sardis taken, and Cræsus marched out to oppose him at the head of the Lydians only; for his allies had all abandoned him. Their strength consisted mostly in cavalry: which Cyrus being well apprised of, he ordered his camels to advance; by whom the horses were so frightened, that they became quite ungovernable. However, the Lydians dismounted, and for some time made a vigorous resistance on foot; but were at last driven into the city, which was taken two days after: and thus the Lydian empire was totally destroyed.

179 Reduces Babylon. After the conquest of Sardis, Cyrus turned his arms against Babylon itself, which he reduced in the manner related under that article. Having settled the civil government of the conquered kingdoms, Cyrus took a review of all his forces, which he found to consist of 600,000 foot, 120,000 horse, and 2000 chariots armed with scythes. With these he extended his dominion all over the nations to the confines of Ethiopia, and to the Red Sea; after which he continued to reign peaceably over his vast empire till his death, which happened about 529 before Christ. According to Xenophon, he died a natural death; but others tell us, that, having engaged in a war with the Scythians, he was by them overthrown and cut in pieces with his whole army, amounting to 200,000 men. But this is very improbable, seeing all authors agree that the tomb of Cyrus was extant at Pasargada in Persia in the time of Alexander the Great; which it could not have been if

Persia.

Sardis taken, and the Lydian empire overthrown.

179 Reduces Babylon.

His death.

110. if he had remained in the possession of the Scythians, as these authors assert.

In the time of Cyrus, the Persian empire extended from the river Indus to the *Ægean Sea*. On the north it was bounded by the *Euxine* and *Caspian Seas*, and on the South by *Ethiopia* and *Arabia*. That monarch kept his residence for the seven cold months at *Pelysion*, by reason of the warmth of that climate; three months in the spring he spent at *Susa*, and two at *Ecbatana* during the heat of summer. On his death-bed he appointed his son *Cambyzes* to succeed him in the empire; and to his other son, *Smerdis*, he gave several considerable governments. The new monarch immediately set on the conquest of *Egypt*; which he accomplished in the manner related in the history of that country.

112. *Cambyzes* conquers *Egypt*.

Having reduced *Egypt*, *Cambyzes* next resolved to turn his arms against the *Carthaginians*, *Hammonians*, and *Ethiopians*. But he was obliged to drop the first of these enterprises, because the *Phœnicians* refused to supply him with ships against the *Carthaginians*, who were a *Phœnician* colony. However, he sent ambassadors into *Ethiopia* with a design to get intelligence of the state and strength of the country. But the *Ethiopian* monarch, being well apprised of the errand on which they came, treated them with great contempt. In return for the presents sent him by *Cambyzes*, he sent his own bow; and advised the *Persians* to make war upon the *Ethiopians* when they could bend such a strong bow as easily as he did, and to thank the gods that the *Ethiopians* had no ambition to extend their dominions beyond their own country.

113. The unsuccessful expedition against *Ethiopia* and the *Hammonians*.

Cambyzes was no sooner informed of this answer by his ambassadors than he flew into a violent passion; and ordered his army immediately to begin their march, without considering that they were neither furnished with provisions nor any other necessary. When he arrived at *Thebes* in *Upper Egypt*, he detached 50,000 men, with orders to destroy the temple of *Jupiter Ammon*: but all these perished in the desert; not a single person arriving either at the oracle, or returning to *Thebes*. The rest of the army, led by *Cambyzes* himself, experienced incredible hardships; for, not being provided with any necessaries, they had not marched a fifth part of the way when they were obliged to kill and eat their beasts of burthen. When these failed, the soldiers fed on roots and roots, as long as any could be found; and at last were reduced to the dreadful necessity of eating one another; every tenth man, on whom the lot fell, being condemned to serve as food for his companions. The king, however, obstinately persisted in his design; till, being apprehensive of the danger he himself was in, he retreated to *Thebes*, after having lost the greatest part of his army.

114. *Hammonian* temper.

Cambyzes was a man of a very cruel and suspicious temper, of which he gave many instances; and the following proved indirectly the cause of his death.—We have already observed that the king of *Ethiopia* sent his bow in return for the present brought to him by the ambassadors of *Cambyzes*. The only man in the *Persian* army who could bend this bow was *Smerdis*, the king's brother; and this instance of his personal strength soon raised the tyrant, that, without any cause alleged, he caused him to be murdered. This

gave occasion to one *Smerdis*, a man, who greatly resented the other *Smerdis* in looks, to assume the name of the deceased prince, and to raise a rebellion against *Cambyzes*, who was generally hated for his cruelty; and this he could the more easily do, as the chief management of affairs had been committed to this *Smerdis* during the king's absence. *Cambyzes*, on receiving the news of this revolt, immediately ordered his army to march, in order to suppress it; but as he was mounting his horse, his sword, slipping out of its scabbard, wounded him in the thigh. On this accident, he asked the name of the city where he was; and being told that it was *Ecbatana*, he said in the presence of all his attendants, "Fate has decreed that *Cambyzes* the son of *Cyrus* shall die in this place." For, having consulted the oracle of *Delos*, which was very famous in that country, he was told that he should die at *Ecbatana*. This he had always understood of *Ecbatana* in *Media*, and had therefore resolved to avoid it. Being now, however, convinced that his end approached, he assembled the chief *Persian* lords who served in the army, and having told them that his brother was certainly dead, he exhorted them never to submit to the impostor, or suffer the sovereignty again to pass from the *Persians* to the *Medes*, to whom *Smerdis* belonged, but to use their utmost endeavours to place one of their own blood on the throne.

As the king's wound mortified, he lived but a few days after this; but the assembly supposing that he had spoken only out of hatred to his brother, quietly submitted to the impostor, who was thus for a time established on the throne. Indeed, from his conduct during the short time which he enjoyed the kingdom, he appears to have been not at all undeserving of a crown. He began with granting to all his subjects an exemption from taxes and military service for three years, and treated all of them in the most beneficent manner. To secure himself on the throne the more effectually, he married *Atossa* the daughter of *Cyrus*; thinking, that in case of a discovery he might hold the empire by her tie. She had before been married to her brother *Cambyzes*, on a decision of the magi that a king of *Persia* might do as he pleased; and by virtue of this decision *Smerdis* also married her as her brother. The extreme caution of *Smerdis*, however, promoted the discovery of his imposture. He had married all his predecessor's wives, among whom was one *Phedyma*, the daughter of *Otræus* a *Persian* soldier of the first rank. *Otræus*, who suspected that the king was not *Smerdis* the son of *Cyrus*, sent a trusty messenger to his daughter, desiring to know whether he was for or not; but *Phedyma*, having never seen this *Smerdis*, could not give any answer. Her father then desired her to inquire at *Atossa*, who could not but know her own brother. However, he was again disappointed; for *Phedyma* acquainted him that all the king's wives were lodged in distinct and separate apartments, without being allowed to see each other. This greatly increased the suspicions of *Otræus*; upon which he sent his daughter a third message, desiring her, the next time she should be admitted to the king's bed, to take an opportunity of feeling whether he had ears or not: for *Cyrus* had formerly caused the ears of *Smerdis* the magian to be cut off for some crime of which he had been

been guilty; so that, if the king had ears, he might then be assured that he was Smerdis the son of Cyrus. The event showed that the suspicions of Otanes were just; and Phedyma having acquainted her father that the king had no ears, a conspiracy was immediately formed against him. While the conspirators were debating about the proper means of carrying their designs into execution, Darius the son of Hystaspes happening to arrive at Susa where his father was governor, they all agreed to make him privy to their design. He told them, at their first meeting, that he thought nobody in the empire but himself had known that Smerdis the son of Cyrus was dead, and the throne usurped by one of the magi; that he had come with a design to kill the usurper without imparting his design to any one, that the glory of such an action might be entirely his own. But since others were apprised of the imposture, he insisted that the usurper should be dispatched without delay. Otanes, on the other hand, was for putting off the enterprise till some better opportunity offered; but Darius protested, that if they did not make the attempt that very day, he would prevent any one from accusing him, by disclosing the whole matter to the impostor himself.

In the mean time, Smerdis and his brother had by great promises prevailed on Prexaspes (the executioner of the true Smerdis) to bind himself by an oath not to discover the fraud they had put on the Persians, and even to make a public speech, declaring that the present king of Persia was really the son of Cyrus. At the time appointed, he began his discourse with the genealogy of Cyrus, putting his hearers in mind of the great favours the nation had received from that prince. After having extolled Cyrus and his family, to the great astonishment of all present, he confessed the whole transaction with regard to the death of Smerdis; telling the people, that the apprehensions of the danger he must inevitably run by publishing the imposture had constrained him to conceal it so long; but now, not being able any longer to act such a dishonourable part, he acknowledged that he had been compelled by Cambyzes to put his brother to death with his own hand, and that the person who possessed the throne was Smerdis the magian. He then begged pardon of the gods and men for the crime he had committed; and fulminating many imprecations against the Persians if they failed to recover the sovereignty, he threw himself headlong from the top of the tower on which he stood, and died on the spot.

In the mean time the conspirators, who were advancing towards the palace, were informed of what had happened; and Otanes was again for deferring the execution of their enterprise: but Darius insisting upon the danger of delay, they proceeded boldly to the palace; and being admitted by the guards, who did not suspect them, they killed both the usurper and his brother; after which they exposed their heads to the people, and declared the whole imposture. The Persians at this were so enraged, that they fell on the whole sect, and killed every one of the magi they could meet with; and had not the slaughter been stopped by night, not one of the order would have been left alive. The day on which this slaughter happened was afterwards celebrated by the Persians with the greatest solemnity, and called by the name of *Magophenia*, or

the slaughter of the Magi. On that festival the magi durst not appear abroad, but were obliged to shut themselves up in their houses. Smerdis the magian reigned only eight months.

When the tumult was a little subsided, the conspirators, who were seven in number, met together in order to elect a new king, or to determine what form of government they should next introduce. Otanes was for a republic: but being overruled by the rest, he declared, that as he was determined not to be a king, neither would he be ruled by one; and therefore insisted that he and his family should ever afterwards remain free from subjection to the royal power. This was not only granted, but it was further agreed by the other six, that whoever was chosen should every year present Otanes with a Median vest, a mark of great distinction among the Persians, because he had been the chief author of the enterprise. They further agreed to meet at a certain place next morning at sunrise on horseback, and that he whose horse first neighed should be king. This being overheard by Oebares, who had the care of Darius's horses, he led a mare over-night to the place, and brought his master's horse to her. The next morning, the horse remembering the place, immediately neighed for the mare; and the five lords dismounting, saluted Darius as their king.

Darius Hystaspes was elected king of Persia in the year 522 B. C. Immediately after his accession, he promoted the other six conspirators to the first employments in the kingdom, married the two daughters of Cyrus, Atossa and Artystona, Parmys the daughter of the true Smerdis, and Phedyma the daughter of Otanes, who had detected the imposture of the magian. He then divided the whole empire into 20 satrapies or governments, and appointed a governor over each division, ordering them to pay him an annual tribute. The inhabitants of Colchis, with some others, were enjoined only to make annual presents, and the Arabians to furnish every year such a quantity of frankincense as equalled the weight of 1000 talents. Thus Darius received the yearly tribute of 14 560 Eubæic talents, upwards of 220,000 pounds sterling.

Under Darius, the building of the temple of Jerusalem, which had been obstructed by Cambyzes and Smerdis, went on successfully, and the Jewish state was entirely restored. The most remarkable of Darius's other transactions were his expeditions against Babylon; against Scythia, India, and Greece. The expedition against Babylon took place in the year 517 B. C. when the people, unable to bear the oppression of the Persians, and likewise discontented because the satrap government was removed from their city to Susa in Persia, took the opportunity of the troubles which happened in the reigns of Cambyzes and Smerdis, to store their city with all kind of provisions sufficient to save them for many years; after which they broke out into an open rebellion, and this quickly brought upon them Darius with all his forces. The Babylonians perceiving themselves shut up by so numerous an army, turned all their thoughts towards the suppression of a long siege, which they imagined would tire out the king's troops. To prevent the consumption of their provisions, they took the most barbarous and cruel resolution that ever was put in execution by any nation. They agreed among themselves to get rid of all ene-

Persia.

necessary mouths; and therefore, gathering together all the old men, women, and children, they strangled them without distinction; every one being allowed only to keep the wife he liked best, and a maid servant to do the work of the house. The siege continued for a year and eight months; nor was there any likelihood of its being ended, when Zopyrus, one of Darius's chief commanders, put him in possession of it by the following stratagem. He cut off his nose and ears, and having mangled his body with stripes in a most cruel manner, he fled to the Babylonians thus disfigured, pretending that he had been so treated by Darius for advising him to raise the siege. Being intrusted with the command of some forces, he cut off several parties of the Persian army, whom Darius thus facilitated in order to raise the character of Zopyrus the higher among the Babylonians. In this manner he so much established his credit, that at last he was made commander in chief of all the Babylonish forces, and the guard of the city committed entirely to his care; and no sooner was this done than he delivered it up to Darius, who, to prevent their rebelling a second time, beat down the walls of that metropolis to the height of six cubits. Three thousand of the most active in the rebellion were impaled; the rest pardoned. As they had destroyed most of their women, the neighbouring nations were commanded to furnish them with wives, and 50,000 women were sent to that city, by which means it was prevented from being depopulated. Zopyrus was rewarded with the highest honours, and had the whole revenues of Babylon bestowed on him for life.

22.
His instruc-
tions for ex-
pedition
against the
Scythians.

After the reduction of Babylon Darius undertook a Scythian expedition, directed against those nations which lie between the Danube and the Tanais. His pretext for this war was, to revenge the calamities which these nations had brought upon Asia about 120 years before, when they invaded and subdued Media; keeping it in subjection for the space of 28 years, as we have related under that article. In this expedition he was attended with an army of 700,000 men. With these he marched to the Thracian Bosphorus; which having passed on a bridge of boats, he reduced all Thrace. From Thrace he advanced to the Danube, where he had appointed his fleet to meet him. This river he passed on another bridge of boats, and entered Scythia. His enemies, however, were too wise to oppose such a formidable power in the open field; and therefore retired before him, wasting the country as they went along, till at last the king, sensible of the danger he was in, resolved to give over the enterprise and return home. In order to do so with safety, he lighted a great number of fires in the night-time, and decamped; leaving behind him the old men and the sick, who fell into the hands of their enemies. The Scythians perceiving that Darius was gone, detached a considerable body to the bridge over the Danube; and as they were well acquainted with the roads, they got thither before the Persians. The Scythians had sent express before hand to persuade the Ionians, whom Darius had left to guard the bridge, to break it down and retire to their own country; and this they pressed the more earnestly, that at the time prescribed by Darius was now expired, they were at liberty to return home, without breaking their word or being

wanting in their duty. Miltiades, prince of the Chersonesus of Thrace, was for embracing so favourable an opportunity of cutting off Darius's retreat, and shaking off the Persian yoke at once: all the other commanders agreed with him, except Hyfistius prince of Miletus; who represented to the Ionian chiefs, that their power was connected with that of Darius, since it was under his protection that each of them was lord in his own city; and that the cities of Ionia would not fail to depose them and recover their liberty, if the Persian power should sink or decline. This speech made a deep impression on the rest, and it was at last determined that they should wait for Darius; and in order to deceive the Scythians, they began to break down the bridge, but advised them to return back and defeat Darius. They did so, but missed him; and he having thus safely escaped so great a danger, immediately re-passed the Bosphorus, and took up his winter quarters at Sardis, leaving Megabyzus, one of his chief generals, to complete the conquest of Thrace.

The king having sufficiently refreshed his troops, he who had suffered extremely in the Scythian expedition, began to think of extending his dominions eastward; and, in order to facilitate his design, resolved in the first place to discover those countries. With this view, he caused a fleet to be built and equipped at Capatyrus, a city on the river Indus. The command of this fleet he gave to one Scylax, a Grecian of Caryandia a city of Caria, who was well versed in maritime affairs. Him he ordered to sail down the current, and make the best discoveries he could of the countries lying on either side of the river, till he arrived at the southern ocean; from whence he was to steer his course westward, and that way return to Persia. Scylax, having exactly observed his instructions, and sailed down the river Indus, entered the Red Sea by the straits of Babelmandel, and on the 30th month from his first setting out, landed at the same place from whence Nechu king of Egypt formerly sent out the Phoenicians who circumnavigated Africa. From hence Scylax returned to Susa, where he gave a full account of his discoveries; upon which Darius, marching into India at the head of a powerful army, reduced that large country, and made it a province of the Persian empire, drawing from thence an annual tribute of 360 talents of gold.

Soon after the expedition of Darius against India happened the revolt of the Ionians, which gave occasion to his expedition into Greece; an account of which is given under the articles ATTICA, GREECE, SPARTA, &c. The ill success which attended him here, however, was so far from making him drop the enterprise, that it only made him the more intent on reducing the Grecians; and he resolved to head his army in person, having attributed his former bad success to the inexperience of his generals. But while he was employed in making the necessary preparations for this purpose, he received intelligence that the Egyptians had revolted, so that he was obliged to make preparations for reducing them also; and before this could be done, the king died, after having reigned 36 years, leaving the throne to his son Xerxes.

This prince ascended the throne of Persia in the year 485 B. C.; and his first enterprise was to reduce the Egyptians; which he effectually did, bringing them

them into a worse state of slavery than they ever had experienced before. After this he resolved on an expedition into Greece; the unfortunate event of which is related under the article ATTICA. By his misfortunes in the Grecian expedition, he became at last so dispirited, that he thenceforth abandoned all thoughts of war and conquests; but growing tyrannical, and oppressing his subjects, he was murdered in his bed, in the year 464 B. C. and 21st of his reign; and was succeeded by his third son Artaxerxes, surnamed *Longimanus* on account of the great length of his arms.

This prince is named *Ahasuerus* in Scripture, and is the same who married Esther, and during the whole of his reign showed the greatest kindness to the Jewish nation. In the beginning of his reign he was opposed by Hytaspes the second son of Xerxes, whom, however, he overcame, though not without considerable difficulty. After this he applied himself to the settlement of the affairs of government, and reforming many abuses which had crept in; and then, being fully established on the throne, he appointed feasts and rejoicings to be made for 180 days in the city of Susa; at one of which he resolved to divorce his queen for disobedience; and afterwards married Esther, as we find it recorded in the sacred writings.

In the fifth year of the reign of Artaxerxes the Egyptians revolted anew, and, being assisted by the Athenians, held out for six years; but were again obliged to submit, and continued in subjection during the whole of his reign. Nothing else remarkable happened during the life of Artaxerxes Longimanus, who died in the 41st year of his reign; and was succeeded by Xerxes II. the only son he had by his queen, though by his concubines he had 17. Xerxes having drunk immoderately at an entertainment immediately after his accession, retired to a chamber in order to refresh himself with sleep; but here he was murdered by Sogdianus, the son of Artaxerxes by one of his concubines, after he had reigned 45 days.

Sogdianus was scarce seated on the throne when he put to death Bagorazus, the most faithful of all his father's eunuchs; by which, and the murder of his sovereign, he became generally odious. Upon this, sensible of the dangerous situation in which he was, he sent for one of his brothers named Ochus, whom he suspected, with a design to murder him the moment he arrived. Ochus, however, understanding his design, put off, by several pretences, his coming, till he had drawn together a powerful army, with which he advanced to the confines of Persia. Here he openly declared, that his design was to revenge his brother's death; which brought over to him many of the nobility and governors of provinces, by whom he was immediately proclaimed king. Sogdianus, seeing himself thus deserted, contrary to the advice of all his friends, came to an accommodation with Ochus; who no sooner had him in his power than he caused him to be suffocated among ashes; a punishment invented on purpose for him.

Ochus being firmly settled on the throne by the death of Sogdianus, changed his name to Darius; and is by historians commonly called *Darius Nothus*, or *The Buffard*. But Artabazus, another of the brothers, seeing in what manner Sogdianus had got the better

of Xerxes, and been afterwards driven out by Ochus, began to entertain thoughts of treating him in the same manner. He was not, however, so successful; for, being defeated in an engagement, he surrendered himself in hopes of mercy, but was immediately put to death by suffocation in ashes. Several other persons were executed: but these severities did not procure him the repose which he expected; for his whole reign was disturbed with violent commotions in various parts of the empire. One of the most dangerous was raised by Pisuthna governor of Lydia; but he being deserted by his Greek mercenaries, was at last overcome, and put to death: however, his son Amorgas continued to infest the maritime provinces of Asia Minor for two years; till he also was taken prisoner by Tissaphernes, the new governor of Lydia, who put him to death. Other insurrections quickly followed this: but the greatest misfortune which befel Darius during the whole course of his reign was the revolt of the Egyptians, who could not be reduced. Before his death he invested Cyrus his youngest son with the supreme government of all the provinces of Asia Minor. This was done through the persuasions of his mother Parysatis, who had an absolute sway over her husband; and she procured this command for him, that he might thereby be enabled to contend for the kingdom after his father's death. She even insisted that the king should declare him heir to the crown before he died; but this he could not by any means be induced to do. He died in the year 405 B. C. and was succeeded by his son Artaxerxes, by the Greeks surnamed *Mnemon* on account of his extraordinary memory.

The most remarkable transaction which happened during the reign of this prince was the revolt of his brother Cyrus. This young prince had been raised to so great power through the interest of his mother, on purpose that he might revolt, as we have already seen. He began with gaining over the cities under the government of Tissaphernes; which quickly produced a war with that governor. Cyrus then began to assemble troops, which he pretended were designed only against Tissaphernes. As he had given great assistance to the Lacedemonians in their wars against the Athenians, he now in return demanded assistance from them; which request they very readily complied with, ordering their fleet immediately to join him, and to obey in every thing the commands of Themistocles his admiral. At last Cyrus, having collected an army of 13,000 Greek mercenaries and 10,000 regular troops of other nations, set out from Sardis, directing his march towards Upper Asia; the army being entirely ignorant of the expedition on which they were going. When they arrived at Tarsus, the Greeks, suspecting that they were marching not to the East, refused to proceed any further; but Cyrus having gained them over with presents and promises, they soon went on with satisfaction. Having arrived at Babylon, Cyrus found his brother with 100,000 men ready to engage him. Whereupon, leaping out of his chariot, he commanded his troops to stand to their arms and fall into their ranks; which was done with great cheerfulness, no time being allowed the Persians to refresh themselves. Clearchus, the commander of the Peloponnesians, advised Cyrus not to charge in person, but to command

Persia.

the rear of the Greek battalions: but this advice he rejected with indignation, saying, that he should thus render himself unworthy of the crown for which he was fighting. As the king's army drew near, the Greeks fell upon them with such fury, that they routed the wing opposite to them almost at the first onset; upon which Cyrus was with loud shouts proclaimed king by those who stood next to him. But he, in the mean time, perceiving that Artaxerxes was wheeling about to attack him in flank, advanced against him with 600 chosen horse, killed Artaxerxes captain of the king's guards with his own hand, and put the whole body to flight. In this encounter, discovering his brother, he spurred on his horse, and, coming up to him, engaged him with great fury; which in some degree turned the battle into a single combat. Cyrus killed his brother's horse, and wounded him on the ground; but he immediately mounted another horse, when Cyrus attacked him again, gave him a second wound, and had already lifted up his hand to give him a third, when the guards, perceiving the danger in which their king was, discharged their arrows at once against his antagonist, who at the same time throwing himself headlong upon his brother, was pierced through by his javelin. He fell dead upon the spot; and all the chief lords of his court, resolving not to survive him, were slain in the same place.

In the mean time, the Greeks having defeated the enemy's left wing commanded by Tissaphernes, and the king's right wing having put to flight Cyrus's left, both parties, being ignorant of what had passed elsewhere, imagined that they had gained the victory. But Tissaphernes acquainting the king that his men had been put to flight by the Greeks, he immediately rallied his troops, in order to attack them. The Greeks, under the command of Clearchus, easily repulsed them, and pursued them to the foot of the neighbouring hills. As night was drawing near, they halted at the foot of the hill, much surprised that neither Cyrus himself, nor any messenger from him, had appeared; for as yet they knew nothing of his death and the defeat of the rest of the army. They determined therefore to return to their camp, which they did accordingly; but found there that the greatest part of their baggage had been plundered, and all their provisions taken, which obliged them to pass the night in the camp without any sort of refreshment. The next morning, as they were still expecting to hear from Cyrus, they received the news of his death, and the defeat of that part of the army. Whereupon they sent deputies to Artaxerxes, who was commander in chief of all the other forces of Cyrus, offering him, as conquerors, the crown of Persia. Artaxerxes rejected the offer, and acquainting them that he intended to set out early in the morning on his return to Ionia, advised them to join him in the night. They followed his directions, and, under the conduct of Clearchus, began their march, arriving at his camp about midnight, whence they set out on their return to Greece. They were at a vast distance from their own country, in the very heart of the Persian empire, surrounded by a victorious and numerous army, and had no way to return again but by forcing their way through an immense track of the enemy's country. But their valour and resolution mastered all these difficulties; and, in spite of a

powerful army, which pursued and harassed them all the way, they made good their retreat for 2325 miles through the provinces belonging to the enemy, and got safe to the Greek cities on the Euxine sea. This retreat (the longest that was ever made through an enemy's country) was conducted at first by Clearchus; but he being cut off through the treachery of Tissaphernes, Xenophon was chosen in his room, who at last brought his men safe into Greece: but for a full account of that famous retreat, see the article XENOPHON.

The war with Cyrus was scarce ended, when another broke out with the Lacedæmonians, on the following account. Tissaphernes being appointed to succeed Cyrus in all his power, to which was added all which he himself possessed formerly, began to oppress the Greek cities in Asia in a most cruel manner. On this they sent ambassadors to Sparta, desiring the assistance of that powerful republic. The Spartans having ended their long war with the Athenians, willingly laid hold of the present opportunity of breaking again with the Persians, and therefore sent against them an army under the command of Thimbro, who, being strengthened by the forces which returned under Xenophon, took the field against Tissaphernes. But Thimbro being soon recalled upon some complaints, Dercyllidas, a brave officer and experienced engineer, was appointed to succeed him; and he carried on the war to much more advantage than his predecessor. On his arrival in Asia, finding that Tissaphernes was at variance with another governor named Pharnabazus, he concluded a truce with the former, and marching against Pharnabazus, drove him quite out of Æolia, and took several cities in other parts. The latter, however, immediately repaired to the Persian court, where he made loud complaints against Tissaphernes, but gave the king a most salutary advice, which was to equip a powerful fleet, and give the command of it to Conon the Athenian, the best sea-officer of his time, by which means he would obstruct the passage of further recruits from Greece; and thus soon put an end to the power of the Lacedæmonians in Asia. This advice being approved of, the king ordered 500 talents for the equipment of a fleet, with directions to give Conon the command of it.

In the mean time, Dercyllidas, with all his valour and skill, suffered himself to be drawn into such a disadvantageous situation, that he must inevitably have been destroyed with his whole army, had it not been through the cowardice of Tissaphernes, who having experienced the Grecian valour at the battle of Cunaxa, could not by any means be induced to attack them. The Lacedæmonians, however, having heard that the Persian monarch was fitting out a great fleet against them, resolved to push on the war as vigorously as possible; and for this purpose sent over Agesilaus one of their kings, and a most experienced commander, into Asia. This expedition was carried on with such secrecy, that Agesilaus arrived at Ephesus before the Persians had the least notice of his designs. Here he took the field with 10,000 foot and 4000 horse, and falling upon the enemy while they were totally unprepared, carried every thing before him. Tissaphernes deceived him into a truce till he had leisure to assemble his forces, but gained little by his treachery;

34
War with
the Lacedæmonians

33
Retreat
of ten
thousand
Greeks,

Perſia. **erv**; for Ageſilaus deceived him in his turn, and while Tiſſaphernes marched his troops into Caria, the Greeks invaded and plundered Phrygia.

Early in the ſpring, Ageſilaus gave out that his deſign was to invade Lydia; but Tiſſaphernes, who remembered the laſt year's ſtratagem, now taking it for granted that Ageſilaus would really invade Caria, made his troops again march to the defence of that province. But Ageſilaus now led his army into Lydia as he had given out, and approached Sardis; upon which Tiſſaphernes recalled his forces from their former rout, with a deſign to relieve the place. But Caria being a very mountainous country, and unfit for horſe, he had marched thither only with the foot, and left the horſe behind on the borders of that province. Whence, on their marching back to the relief of Sardis, the horſe being ſome days march before the foot, Ageſilaus took the advantage of ſo favourable an opportunity, and fell upon them before the foot could come to their aſſiſtance. The Perſians were routed at the very firſt onſet; after which Ageſilaus over-ran the whole country, enriching both himſelf and his army with the ſpoils of the conquered Perſians.

By this continued ill fortune Artaxerxes was ſo much provoked againſt Tiſſaphernes, that he ſoon after cauſed him to be put to death.

On the death of Tiſſaphernes, Tithrauſtes, who was appointed to ſucceed him, ſent large preſents to Ageſilaus, in hopes of perſuading him to abandon his conquelts; but finding that commander was not by any means to be induced to relinquish the war, he ſent Timocrates of Rhodes into Greece, with large ſums of money to corrupt the leading men in the cities, and rekindle a war againſt the Lacedæmonians. This ſtratagem produced the intended effect; for the cities of Thebes, Argos, Corinth, and others, entering into a confederacy, obliged them to recal Ageſilaus to the defence of his own country.

After the departure of Ageſilaus, which happened in the year 354 B. C. the Lacedæmonian power received a ſevere blow at Cnidos, where their fleet was entirely defeated by that of Artaxerxes under Conon, 50 of their ſhips being taken in the engagement; after which, Conon and Pharnabazus being maſters of the ſea, ſailed round the iſlands and coaſts of Aſia, taking the cities there which had been reduced by the Lacedæmonians. Sestos and Abydos only held out, and reſiſted the utmoſt efforts of the enemy, though they had been beſieged both by ſea and land.

Next year Conon having aſſembled a powerful fleet, again took Pharnabazus on board, and reduced the iſland of Melos, from whence he made a deſcent on the coaſts of Lyconia, pillaging all the maritime provinces, and loading his fleet with an imenſe booty. After this, Conon obtained leave of him to repair to Athens with 80 ſhips and 50 talents, in order to rebuild the walls of that city; having firſt convinced Pharnabazus, that nothing could more effectually contribute to the weakening of the power of Sparta than putting Athens again in a condition to rival its power. He no ſooner arrived at Piræus the port of Athens, but he began to work; which, as he had a great number of hands, and was ſeconded by the zeal of all thoſe that were well inclined to the Athenians, was ſoon completed, and the city not only reſtored to

its former ſplendor, but rendered more formidable than ever. The Lacedæmonians were now reduced to the neceſſity of accepting ſuch terms of peace as they could procure. The terms were, that all the Greek cities in Aſia ſhould be ſubject to the king of Perſia, as alſo the iſlands of Cyprus and Clazomena; that the iſlands of Seyros, Lemnos, and Imbros, ſhould be reſtored to the Athenians, and all the cities of Greece, whether ſmall or great, ſhould be declared free; and by the ſame treaty, Artaxerxes engaged to join thoſe who accepted the terms he propoſed, and to aſſiſt them to the utmoſt of his power againſt ſuch as ſhould reject them.

Artaxerxes, being now diſengaged from the Grecian war, turned his arms againſt Evagoras king of Cyprus. This man was deſcended from the ancient kings of Salamine, the capital city of the iſland of Cyprus. His anceſtors had held that city for many ages in quality of ſovereigns; but were at laſt driven out by the Perſians, who, making themſelves maſters of the whole iſland, reduced it to a Perſian province. Evagoras, however, being a man of an enterpriſing genius, ſoon became weary of living in ſubjection to a foreign power, drove out the Perſian governor, and recovered his paternal kingdom. Artaxerxes attempted to drive him out of it; but, being diverted by the Greek war, was obliged to put off the enterprize. However, Conon, by means of Cteſias chief phyſician to Artaxerxes, got all differences accommodated, and Artaxerxes promiſed not to moleſt him in the poſſeſſion of his ſmall kingdom. But Evagoras ſoon becoming diſcontented with ſuch a narrow poſſeſſion, gradually reduced under his ſubjection almoſt the whole of the iſland. Some, however, there were, who held out againſt him, and theſe immediately applied to Artaxerxes for aſſiſtance; and he, as ſoon as the war with Greece was at an end, ſent all his force againſt Evagoras, intending to drive him quite out of the iſland. The Athenians, however, notwithſtanding the favours lately conferred upon them by the king of Perſia, could not forbear aſſiſting their old ally in ſuch a dreadful emergency. Accordingly, they ſent him ten men of war under the command of Philocrates; but the Lacedæmonian fleet, commanded by Talentias brother to Ageſilaus, falling in with them near the iſle of Rhodes, ſurrounded them ſo that not one ſhip could eſcape. The Athenians, determined to aſſiſt Evagoras at all events, ſent Chabrias with another fleet and a conſiderable body of land forces; and with the aſſiſtance of theſe he quickly reduced the whole iſland. But in a ſhort time, the Athenians being obliged, in conſequence of the treaty concluded with the Perſians, to recal Chabrias, Artaxerxes attacked the iſland with an army of 300,000 men, and a fleet of 300 ſhips. Evagoras applied to the Egyptians, Libyans, Arabians, Tyrians, and other nations, from whom he received ſupplies both of men and money; and fitted out a fleet, with which he ventured an engagement with that of Artaxerxes. But being defeated, and obliged to ſhut himſelf up in Salamine, he was cloſely beſieged by ſea and land. Here at laſt he was obliged to capitulate, and abandon to the Perſians the whole of the iſland except Salamine, which he held as a king tributary to Artaxerxes.

The Cyprian war being ended, Artaxerxes turned his

Perſia.
30
Unſucceſs-
ful expe-
ditions
againſt the
Caduſians
and Egyp-
tians.

his arms againſt the Caduſians, whoſe country lay between the Euxine and Caſpian ſeas. But theſe nations were too well accuſtomed to war to be overcome by the Perſians; and therefore the king was obliged to abandon the project, after having loſt a great number of his troops and all the horſes which he took out with him. In his Egyptian expedition, which happened immediately after the Caduſian war, he was attended with little better ſucceſs; which, however, was owing to the bad conduct of his general Pharnabazus. This commander being entruſted with the management of the Egyptian war, ſent an ambaffador to Athens, complaining that Chabrias had engaged in the ſervice of an enemy of the king of Perſia, with whom the ſtate of Athens was in alliance, and threatening the republic with his maſter's reſentment if proper ſatisfaction was not given: at the ſame time he demanded Iphicrates, another Athenian, and the beſt general of his time, to command the Greek mercenaries in the Perſian ſervice. This the Athenians complied with; and Iphicrates having muſtered his troops, ſo exerciſed them in all the arts of war, that they became afterwards very famous among the Greeks under the name of *Iphicrateſian ſoldiers*. Indeed he had ſufficient time to inſtruct them; for the Perſians were ſo ſlow in their preparations, that two whole years elapſed before they were ready to take the field. At the ſame time Artaxerxes, that he might draw the more mercenaries out of Greece, ſent ambaffadors to the different ſtates in it, declaring it to be his will and pleaſure that they ſhould live at peace with each other, on the terms of the treaty lately concluded: which declaration was received with pleaſure by all the ſtates except Thebes, who aſpired at the ſovereignty of Greece; and accordingly reſuſed to conform to it. All things, however, at laſt being ready for the expedition, the troops were muſtered at the city then called *Ace*, and ſince *Ptolemais*: where they were found to conſiſt of 200,000 Perſians under the command of Pharnabazus, and 20,000 Greeks led by Iphicrates. The fleet conſiſted of 200 galleys, beſides a vaſt number of other veſſels which followed with provisions. The fleet and army began to move at the ſame time; and that they might act in concert, they ſeparated as little as poſſible. It was propoſed, that the war ſhould begin with the ſiege of Peluſium; but Nectanebus, the revolted king of Egypt, had provided ſo well for the defence of the place, that it was thought expedient to drop the enterprize, and make a deſcent at one of the mouths of the Nile. In this they ſucceeded: for the Egyptians not expecting them at that place, had not taken ſuch care to fortify it as at Peluſium. The fortrefs of conſequence was eaſily taken, and all the Egyptians in it put to the ſword. After this, Iphicrates was for embarking the troops without loſs of time, and attacking Memphis the capital of Egypt. Had this opinion been followed before the Egyptians recovered from the conſternation into which they were thrown, it is highly probable that the whole country might have been reduced at once: but Pharnabazus would undertake nothing before the reſt of the forces were come up. Iphicrates then, in the utmoſt vexation at loſing ſo favourable an opportunity, preſſed Pharnabazus to allow him to attack the place with the Greek

mercenaries only; but he reſuſed this alſo, from a mean jealouſy of the honour which Iphicrates might acquire; and in the mean time the Egyptians recovered ſufficient courage to put themſelves in ſuch a poſture of defence, that they could not be attacked with any probability of ſucceſs; and at the ſame time the Nile overflowing as uſual, obliged them to return to Phoenice. The expedition was again undertaken 12 years after, but without ſucceſs.

The laſt years of the reign of Artaxerxes were greatly diſturbed by diſſenſions in his family; which at laſt broke his heart, and he died in the 94th year of his age, and 46th of his reign. He was ſucceeded by one of his ſons named *Ochus*, who behaved with ſuch cruelty, that almoſt one half of his dominions revolted as ſoon as he came to the throne. But, by reaſon of the diſſenſions of the rebels among themſelves, all of them were reduced, one after another; and among the reſt, the Sidonians, finding themſelves betrayed, burnt themſelves to the number of 40,000, together with their wives and children.

Ochus, having quelled all the inſurgents, immediately ſet himſelf about reducing Egypt, and for this purpose procured a reinforcement of other 10,000 mercenaries from Greece. On his march, he loſt a great number of his men drowned in the lake Serbonis, which lies between Phoenice and Egypt, extending about 30 miles in length. When the ſouth wind blows, the whole ſurface of this lake is covered with ſand, in ſuch a manner that no one can diſtinguiſh it from the firm land. Several parties of Ochus's army were loſt in it for want of proper guides; and it is ſaid that whole armies have ſometimes periſhed in the ſame place. When he arrived in Egypt, he detached three bodies to invade the country in different parts; each being commanded by a Perſian and a Greek general. The firſt was led by Lachares the Theban, and Roſſices governor of Lydia and Ionia; the ſecond by Nicoſtratus the Theban and Ariſtaſanes; the third by Mentor the Rhodian and Bagoas an eunuch. The main body of the army he kept with himſelf, and encamped near Peluſium, with a deſign to watch the events of the war there. The event was ſucceſſful, as we have related under the article *EGYPT*; and Ochus having reduced the whole country, diſmantled their ſtrongholds, plundered the temples, and returned to Babylon loaded with booty.

The king, having ended this war with ſuch ſucceſs, conferred very high rewards on his mercenaries and others who had diſtinguiſhed themſelves. To Mentor the Rhodian he gave 100 talents, and other preſents to a great value; appointing him alſo governor of all the coaſts of Aſia, and committing to his care the whole management of the war with the ſtates revolting on againſt ſome provinces that had revolted in the beginning of his reign; and all theſe either by ſtratagemas, or by force, he at laſt reduced; reſtoring the king's authority in all theſe places. Ochus then, finding himſelf free from all troubles, gave his attention to nothing but his pleaſures, leaving the adminiſtration of affairs entirely to Bagoas the eunuch, and to Mentor. He alſo agreed to ſhare the power between them: in conſequence of which the former had the provinces of Upper Aſia, and the latter all the reſt. Bagoas,

40
Ochus ſucceeded Ar-
taxerxes.

41
Reduces Egypt.

Perfia. goas, being by birth an Egyptian, had a great zeal for the religion of his country, and endeavoured, on the conquest of Egypt, to influence the king in favour of the Egyptian ceremonies; but, in spite of all his endeavours, Ochus not only refused to comply, but killed the sacred bull, the emblem of the Egyptian god Apis, plundered the temples, and carried away their sacred records. This Bagoas supposed to be the highest guilt which a human creature could commit; and therefore poisoned his master and benefactor in the 42nd year of his reign. Nor did his revenge stop here; for he kept the king's body, causing another to be buried in its stead; and because the king had caused his attendants eat the flesh of Apis, Bagoas cut his body in pieces, and gave it so mangled to be devoured by cats, making handles for swords of his bones. He then placed Arses the youngest of the deceased king's sons on the throne, that he might the more easily preserve the whole power to himself.

Arses did not long enjoy even the shadow of power which Bagoas allowed him, being murdered in the second year of his reign by that treacherous eunuch, who now conferred the crown on Darius Codomannus, a distant relation of the royal family. Neither did he incline to let him enjoy the crown much longer than his predecessor; for, finding that he would not suffer himself to be guided by him in all things, the treacherous Bagoas brought him a poisonous potion; but Darius got rid of him by his own artifice, causing him to drink the poison which he brought. This established Darius in the throne as far as security from internal enemies could do so; but in a very little time his dominions were invaded, and, we may say, the same moment conquered, by Alexander the Great. The particulars of that hero's conquest are related under the article **MACEDON**; we shall therefore here only take notice of the fate of Darius himself, with which the Persian empire concluded for many ages. After the battle of Arbela, which was decisive in favour of Alexander, the latter took and plundered Persepolis, from whence he marched into Media, in order to pursue Darius, who had fled to Ecbatan the capital of that province. This unhappy prince had still an army of 40,000 foot, among whom were 4000 Greeks, who continued faithful to the last. Besides these, he had 4000 slingers and 3000 horse, most of them Bactrians, and commanded by Bessus governor of Bactria. When Darius heard that Alexander was marched to Ecbatan, he retired into Bactria, with a design to raise another army, but soon after, changing his mind, he determined to venture a battle with the forces he still had left. On this Bessus governor of Parthia, and Nabarzanes a Persian lord of great distinction, formed a conspiracy against him, proposing to seize his person, and to Alexander pursued them, to gain his friendship and protection by betraying their master into his hands; but if they escaped, their design was to murder him, and usurp the crown. The troops were easily joined over, by representing to them the desperate situation of Darius's affairs; but Darius himself, though informed of their proceedings, and solicited to trust his person among the Greeks, refused to give credit to the report, or follow such a salutary counsel. The consequence of this was, that he was in a few days seized by the traitors; who, out

of respect to the royal dignity, bound him with golden chains, and shutting him up in a covered cart, fled with him towards Bactria. The cart was covered with skins, and strangers appointed to drive it without knowing who the prisoner was. Bessus was proclaimed commander in chief in the room of Darius by the Bactrian horse; but Artabazus and his sons, with the forces they commanded, and the Greeks, under the command of one *Patron*, retired from the body of the army under Bessus, and marched over the mountains towards Parthiene. In the mean time Alexander arriving at Ecbatan, was informed that Darius had left the place five days before. He then dispatched orders to Clitus, who had fallen sick at Susa, to repair, as soon as he recovered, to Ecbatan, and from thence to follow him into Parthia with the cavalry and 6000 Macedonians, who were left in Ecbatan. Alexander himself with the rest of the army pursued Darius; and the 11th day arrived at *Rhages*, having marched in that space of time 3300 furlongs. Most of those who accompanied him died through the fatigue of so long a march; insomuch that, on his arrival at Rhages, he could scarce muster 60 horsemen. Finding that he could not come up with Darius, who had already passed the Caspian straits, he staid five days at Rhages, in order to refresh his army and settle the affairs of Media. From thence he marched into Parthia, and encamped at a small distance from the Caspian straits, which he passed the next day without opposition. He had scarce entered Parthia, when he was intimated that Bessus and Nabarzanes had conspired against Darius, and designed to seize him. Hereupon, leaving the main body of the army behind with Craterus, he advanced with a small troop of horse lightly armed; and having marched day and night without ever halting, except for a few hours, he came on the third day to a village where Bessus with his Bactrians had encamped the day before. Here he understood that Darius had been seized by the traitors; that Bessus had caused him to be shut up in a close cart, which he had sent before, that he might be the more sure of his person; and that the whole army except Artabazus and the Greeks, who had taken another rout, obeyed Bessus. Alexander therefore taking with him a small body of light-armed horse, for the others could not possibly proceed further, at last came in sight of the barbarians, who were marching in great confusion. His unexpected appearance struck them, though far superior in number, with such terror, that they immediately betook themselves to flight; and because Darius refused to follow them, Bessus and those who were about him discharged their darts at the unfortunate prince, leaving him wallowing in his blood. After this they all fled different ways, and were pursued with great slaughter by the Macedonians. In the mean time the horse that drew the cart in which Darius was, stopped of their own accord, for the drivers had been killed by Bessus, near a village about four furlongs from the highway. Thence Porus a Macedonian, being pressed with thirst in the pursuit of the enemy, was directed by the instinct of a fountain to retreat thither, not far from the place where they stopped. As he was filling his helmet with water, he heard the groans of a dying man; and looking round him, discovered a cart with a team of horses, unable to

Perfia.46
And murdered.45
his fei-
by his
sub-

Persia.

move by reason of the many wounds they had received. When he drew near, he perceived Darius lying in the cart, and very near his end, having several darts sticking in his body. However, he had strength enough left to call for some water, which Polystratus readily brought him. Darius, after drinking, turned to the Macedonian, and with a faint voice told him, that, in the deplorable state to which he was reduced, it was no small comfort to him that his last words would not be lost: he then charged him to return his hearty thanks to Alexander for the kindness he had shown to his wife and family, and to acquaint him, that, with his last breath, he besought the gods to prosper him in all his undertakings, and make him sole monarch of the universe. He added, that it did not so much concern him as Alexander to pursue and bring to condign punishment these traitors who had treated their lawful sovereign with such cruelty, that being the common cause of all crowned heads. Then, taking Polystratus by the hand, "Give Alexander your hand," says he, "as I give you mine, and carry him, in my name, the only pledge I am able to give, in this condition, of my gratitude and affection." Having uttered these words, he expired in the arms of Polystratus. Alexander coming up a few minutes after, bewailed his death, and caused his body to be interred with the highest honours. The traitor Bessus being at last reduced to extreme difficulties, was delivered up by his own men naked and bound into the hands of the Macedonians; on which Alexander gave him up to Oxyathres the brother of Darius, to suffer what punishment he should think proper. Plutarch tells us that he was executed in the following manner: Several trees being by main force bent down to the ground, and one of the traitor's limbs tied to each of them, the trees, as they were suffered to return to their natural position, flew back with such violence, that each carried with it the limb that was tied to it.

47
His murderers, pursued.

48
Revolt of the Parthians.

Thus ended the empire of Persia, 209 years after it had been founded by Cyrus. After the death of Alexander the Persian dominions became subject to Seleucus Nicator, and continued subject to him for 62 years, when the Parthians revolted, and conquered the greatest part of them. To the Parthians they continued subject for 475 years; when the sovereignty was again restored to the Persians, as related under the article PARTHIA.

49
Persian empire again restored by Artaxares.

The restorer of the Persian monarchy was Artaxares, or Artaxares, who was not only a private person, but of spurious birth. However, he possessed great abilities, by which means he executed his ambitious projects. He was no sooner seated on the throne than he took the pompous title of *king of kings*, and formed a design of restoring the empire to its ancient glory. He therefore gave notice to the Roman governors of the provinces bordering on his dominion, that he had a just right, as the successor of Cyrus, to all the Lesser Asia; which he therefore commanded them immediately to quit, as well as the provinces on the frontiers of the ancient Parthian kingdom, which were already his. The consequence of this was a war with Alexander Severus the Roman emperor. Concerning the event of this war there are very different accounts. It is certain, however, that, on account of his exploits against Artaxares, Alexander took the titles of *Par-*

thicus and *Perseus*: though, it would seem, with no great reason, as the Persian monarch lost none of his dominions, and his successors were equally ready with himself to invade the Roman territories.

Artaxares dying after a reign of 12 or 15 years, was succeeded by his son Sapor: a prince of great abilities both of body and mind, but fierce, haughty, untractable, and cruel. He was no sooner seated on the throne than he began a new war with the Romans. In the beginning he was unsuccessful: being obliged, by the young emperor Gordian, to withdraw from the Roman dominions, and was even invaded in his turn; but, in a short time, Gordian being murdered by Philip, the new emperor made peace with him upon terms very advantageous to the Persians. He was no sooner gone than Sapor renewed his incursions, and made such alarming progress, that the emperor Valerian, at the age of 70, marched against him in person with a numerous army. An engagement ensued, in which the Romans were defeated, and Valerian taken prisoner. Sapor pursued his advantages with such insolence of cruelty, that the people of the provinces took arms, first under Calpurnius a Roman general, and then under Odenatus prince of Palmyrene. Thus they not only protected themselves from the insults of the Persians, but even gained many great victories over them, and drove Sapor with disgrace into his own dominions. In his march he is said to have made use of the bodies of his unfortunate prisoners to fill up the hollow roads, and to facilitate the passage of his carriages over such rivers as lay in his way. On his return to Persia, he was solicited by the kings of the Cadusians, Armenians, Bactrians, and other nations, to set Valerian at liberty; but to no purpose. On the contrary, he used him the worse; treated him daily with indignities, set his foot upon his neck when he mounted his horse, and, as is affirmed by some, flayed him alive after some years confinement; and caused his skin to be tanned, which he kept as a monument of his victory over the Romans. This extreme insolence and cruelty was followed by an uninterrupted course of misfortune. Odenatus defeated him in every engagement, and even seemed ready to overthrow his empire; and after him Aurélian took ample vengeance for the captivity of Valerian. Sapor died in the year of Christ 273, after having reigned 31 years; and was succeeded by his son Hormisdas, and he by Varanes I. Concerning both these princes we know nothing more than that the former reigned a year and ten days, and the latter three years; after which he left the crown to Varanes II. who seems to have been so much awed by the power of the Romans, that he durst undertake nothing. The rest of the Persian history, to the overthrow of the empire by the Saracens, affords nothing but an account of their continued invasions of the Roman empire, which more properly belongs to the history of Rome: and to which therefore we refer. The last of the Persian monarchs, of the line of Artaxares, was Ishagertes, or Jendegert, as he is called by the Arabian and Persian historians, who was cotemporary with Omar the second caliph of the Mahomet. He was scarce seated on the throne, when he found himself attacked by a powerful army of Saracens under the command of one Sad, who invaded the country through Chaldea. The Persian general took all imaginable pains to harass the Arabs on their march;

50
Succeeded by Sapor, who takes Valerian the Roman emperor prisoner.

51
And treats him cruelly.

52
The Persian empire overthrown by the Saracens.

Perſia. march; and having an army ſuperior to them in numbers, employed them continually in ſkirmiſhes; which were ſometimes favourable to him and ſometimes otherwiſe. But Sad, perceiving that this lingering war would deſtroy his army, determined to haſten forward, and force the enemy to a general engagement. The Perſians declined this for a long time; but at length, finding a convenient plain where all their forces might act, they drew up in order of battle, and reſolved to wait for the Arabs. Sad having diſpoſed his men in the beſt order he could, attacked the Perſians with the utmoſt fury. The battle laſted three days and three nights; the Perſians retiring continually from one poſt to another, till at laſt they were entirely defeated; and thus the capital city, and the greateſt part of the dominions of Perſia, fell into the hands of the Arabs. The conquerors ſeized the treaſures of the king; which were ſo vaſt, that, according to a Mahometan tradition, their prophet gave the Saracen army a miraculous view of thoſe treaſures before the engagement, in order to encourage them to fight.

After the loſs of this battle, Jezdegerd retired into Choraffan, where he maintained himſelf as king, having under his ſubjection two other provinces, named *Kerman* and *Sageſſan*. But after he had reigned in this limited manner for 19 years, one of the governors of the few towns he had left betrayed it, and called in the Turks. This place was called *Alerou*, ſeated on the river Gihon or Odus. Jezdegerd immediately marched againſt the rebels and their allies. The Perſians were defeated; and the unfortunate monarch, having with much difficulty reached the river, found there a little boat, and a fiſherman to whom it belonged. The king offered him a bracelet of precious ſtones; but the fellow, equally brutal and ſtupid, told him that his fare was five furthings, and that he would neither take more nor leſs. While they diſputed, a party of the rebel horſe came up, and knowing Jezdegerd, killed him in the year 652.

Jezdegerd left behind him a ſon named *Finouz*, and a daughter named *Dara*. The latter eſpouſed Bothenay, whom the rabbinical writers have dignified with the title of the *head of the captivity*; and who, in fact, was the prince of the Jews ſettled in Chaldea. As for Finouz, he ſtill preſerved a little principality; and when he died, left a daughter named *Mah aſſid*, who married Walid the ſon of the caliph Abdalmalek, by whom ſhe had a ſon named *Iezid*, who became caliph, and conſequently ſovereign of Perſia; and ſo far was this prince from thinking himſelf above claiming the title derived from his mother, that he conſtantly ſtyled himſelf *the ſon of Khoſrou king of Perſia, the deſcendant of the caliph Marwan, and among whoſe anceſtors on the ſide of the mother were the Roman emperor and the khacan*.

53 Perſia continued to be ſubject to the Arabs till the decline of the Saracen empire, when it was ſeized by various uſurpers, till the time of Jenghiz Khan, who conquered it as well as almoſt all the reſt of Aſia. After his death, which happened in the year 1227, Perſia, together with the neighbouring countries, were governed by officers appointed by his ſucceſſors, who reigned at Kiarakorum, in the eaſtern parts of Tartary, till the year 1253, when it became once more the ſeat of a mighty empire under Hulaku the Mogul, who in 1256 aboliſhed the khalifat, by taking the city of BAGDAD, as related under that article. After the death

of Hulaku, his ſon Abaka ſucceeded to his extenſive dominions; and his firſt care was to ſhut up all the avenues of his empire againſt the other princes of the race of Jenghiz Khan, who reigned in different parts of Tartary. His precautions, however, were of little avail; for in the very beginning of his reign he was invaded by Barkan Khan, of the race of Jagatay the ſon of Jenghiz Khan, from Great Bukharia, with an army of 300,000 men. Abaka was but indifferently prepared to oppoſe ſuch a formidable power; but, happily for him, his antagoniſt died before the armies came to an engagement, upon which the invaders diſperſed and returned to Tartary. In the year 1264, Armenia and Anatolia were ravaged by the Mamlucks from Egypt, but were obliged to fly from Abaka; who thus ſeemed to be eſta bliſhed in the poſſeſſion of an empire almoſt as extenſive as that of the ancient Perſian kings. His tranquillity, however, was of ſhort duration; for in 1268 his dominions were invaded by Borak Khan, a prince likewiſe of the race of Jagatay, with an army of 100,000 men. He quickly reduced the province of Choraffan, where he met with little oppoſition, and in 1269 advanced as far as Aderſſon, where Abaka had the bulk of his forces. A bloody battle enſued; in which Abaka was victorious, and Borak obliged to fly into Tartary, with the loſs of all his baggage and great part of his army. Abaka died in 1282, after a reign of 17 years, not without ſuſpicion of being poiſoned; and was ſucceeded by his brother Ahmed Khan. He was the firſt of the family of Jenghiz Khan who embraced Mahometaniſm; but neither he nor his ſucceſſors appear to have been in the leaſt verſed in the arts of government; for the Perſian hiſtory, from this period, becomes only an account of inſurrections, murders, rebellions, and poiſonings, till the year 1335, when it ſplit all to pieces, and was poſſeſſed by a great number of petty princes; all of whom were at perpetual war with each other till the time of Timur Beg, or Tamerlane, who once more reduced them all under one juriſdiction.

After the death of Tamerlane, Perſia continued to be governed by his ſon Shah Rukh, a wife and valiant prince: but immediately after his death fell into the ſame confuſion as before; being held by a great number of petty tyrants, till the beginning of the 16th century, when it was conquered by Shah Iſmael Saſi, or Seſi; of whoſe family we have the following account. His father was Sheykh Hayder or Haydr, the ſon of Sultan Juneyd, the ſon of Sheykh Ibrahim, the ſon of Sheykh Ali, the ſon of Sheykh Muſa, the ſon of Sheykh Seſi, who was the 13th in a direct line from Ali the ſon-in-law of the prophet Mahomet. When Tamerlane returned from the defeat of Bajazet the Turkiſh ſultan, he carried with him a great number of captives out of Karamania and Anatolia, all of whom he intended to put to death on ſome remarkable occaſion; and with this reſolution he entered Ardeſſil, or Ardevil, a city of Aderbijan, about 25 miles to the eaſt of Taurus, where he continued for ſome days. At this time lived in that city the Sheykh Saſi or Seſi above-mentioned, reputed by the inhabitants to be a ſaint; and, as ſuch, much revered by them. The ſame of Saſi's ſanctity ſo much moved Tamerlane, that he paid him frequent viſits; and, when he was about to depart, promiſed to grant whatever favour he ſhould aſk. Sheykh Saſi, who had been informed of Tamer-

54 Under Tamerlane and his ſucceſſors.

55 Conquered by Iſmael Saſi.

Persia. Ismael's design to put the captives to death, requested of the conqueror that he would spare the lives of those unfortunate men. Tamerlane, desirous of obliging him, not only granted this request, but delivered them up to him to be disposed of as he thought fit, upon which the Sheykh furnished them with clothes and other necessaries as well as he could, and sent them home to their respective countries. This generous action proved very beneficial to the family; for the people were so much affected with such an extraordinary instance of virtue, that they repaired in great numbers to Safi, bringing with them considerable presents; and this so frequently, that few days passed in which he was not visited by many. Thus the descendants of the Sheykh made a conspicuous figure till the year 1486, when they were all destroyed by the Turks except Ismael, who fled to Ghilan, where he lived under the protection of the king of that country; after which he became conspicuous on the following occasion.

There was at that time, among the Mahometans, a vast number of people dispersed over Asia; and among these a particular party who followed that of Haydr the father of Ismael, which Sheykh Sifi, one of his ancestors, had brought into great reputation. Ismael, who had assumed the surname of *Safi*, or *Sage*, finding that Persia was all in confusion, and hearing that there was a great number of the Hyderian sect in Karamania, removed thither. There he collected 7000 of his party, all devoted to the interest of his family; and while he was yet only 14 years of age, conquered Shirwan. After this he pursued his conquests; and as his antagonists never united to oppose him, had conquered the greatest part of Persia, and reduced the city of Bagdad by the year 1510. However, his conquests on the west side were soon stopped by the Turks; for, in 1511, he received a great defeat from Selim I. who took Tauris; and would probably have crushed the empire of Ismael in its infancy, had he not thought the conquest of Egypt more important than that of Persia. After his defeat by Selim, Ismael never undertook any thing of consequence. He died in 1523, leaving the crown to his eldest son Tahmasp I.

The new Shah was a man of very limited abilities, and was therefore invaded by the Turks almost instantly on his accession to the throne. However, they were obliged to retreat by an inundation, which overflowed their camp, and which frightened them with its red colour, probably arising from the nature of the soil over which it passed. Tahmasp, however, reduced Georgia to a province of the Persian empire; that country being in his time divided among a number of petty princes, who, by reason of their divisions, were able to make little opposition.

The reigns of the succeeding princes afford nothing remarkable till the time of Shah Abbas I. surnamed the Great. He ascended the throne in the year 1584; and his first care was to recover from the Turks and Tartars the large provinces they had seized which formerly belonged to the Persian empire. He began with declaring war against the latter, who had seized the finest part of Chorassan. Accordingly, having raised a powerful army, he entered that province, where he was met by Abdallah Khan the chief of the Uzbek Tartars. The two armies lay in sight of each other

for six months; but at length Abbas attacked and defeated his enemies, forcing them, for that time, to abandon Chorassan. Here he continued for three years; and on his leaving that place, fixed the seat of government at Ispahan, where it has continued ever since. His next expedition was against the Turks. Understanding that the garrison of Tauris was in no expectation of an enemy, he formed a design of surprising the place; and having privately assembled a few forces, he marched with such celerity, that he reached a pass called *Shibli*, very near Tauris, in six days, though it is usually 18 or 20 days journey for the caravans. Here the Turks had posted a few soldiers, rather for the purpose of collecting the customs on such commodities as were brought that way, than of defending the pass against an enemy. Before they came in sight of this pass, Abbas and some of his officers left the rest of the army, and rode briskly up to the turnpike. Here the secretary of the customhouse, taking them for merchants, demanded the usual duties. Abbas replied, that the person who had the purse was behind, but at the same time ordered some money to be given him. But while the secretary was counting it, he was suddenly stabbed by the Shah's order; and the officers who were with him suddenly falling upon the few soldiers who were there, obliged them to submit; after which he entered the pass with his army. The governor of Tauris marched out with all the troops he could collect on so short a warning; but being inferior to the Persians, he was utterly defeated, and himself taken prisoner; after which the city was obliged to submit, as also a number of places in the neighbourhood. One city only, called *Ormus*, being very strongly situated, resisted all the efforts of Abbas; but was at last taken by the assistance of the Kurds, whom he gained over by promising to share the plunder of the place with them. But instead of this, he formed a design to cut them all off at once; fearing that they might at another time do the Turks a service of the same nature that they had done to him just now. For this reason he invited their chiefs to dine with him; and having brought them to a tent, the entrance to which had several turnings, he stationed on the inside two executioners, who cut off the heads of the guests as soon as they entered.

After this Shah Abbas considerably enlarged his dominions, and repelled two dangerous invasions of the Turks. He attempted also to promote commerce, and civilize his subjects; but stained all his great actions by his abominable cruelties, which he practised on every one who gave him the least cause of offence; nay, frequently without any cause at all. He took the Isle of Ormus from the Portuguese, who had kept it since 1577, by the assistance of some English ships in 1622; and died six years after, aged 70.

The princes who succeeded Shah Abbas the Great, were remarkable only for their cruelties and debaucheries, which occasioned a revolution in 1716, when the Shah Ruffein was dethroned by the Afghans, a people inhabiting the country between Persia and India; who being oppressed by the ministers, revolted under the conduct of one Merewis. The princes of the Afghan race continued to enjoy the sovereignty for no more than 16 years, when Ashraff the reigning Shah was dethroned by one of his officers*. On this

Tahmasp,

Thamas, otherwise called *Prince Thomas*, the only survivor of the family of *Abbas*, assembling an army, invited into his service *Nadir Khan*, who had obtained great reputation for his valour and conduct. He was the son of a Persian nobleman, on the frontiers of *Uzbek Tartary*; and his uncle, who was his guardian, keeping him out of possession of the cattle and estate, which was his inheritance, he took to robbing the caravans; and, having increased his followers to upwards of 5000 men, became the terror of that part of the country, and especially of his uncle, who had seized his estate. His uncle therefore resolved to make his peace with him, and with that view invited him to the cattle, where he entertained him in a splendid manner; but *Nadir Khan* ordered his throat to be cut next night, and all his people to be turned out of the cattle. No sooner had *Nadir Khan* got the command of the Persian army, than he attacked and defeated the usurper *Ehriff*, put him to death, and recovered all the places the *Turks* and *Russians* had made themselves masters of during the rebellion; and then prince *Thamas* seemed to be established on the throne: but *Nadir Khan*, to whom *Thamas* had given the name of *Thamas Kouli Khan*, that is, *the Slave of Thamas*, thinking his services not sufficiently rewarded, and pretending that the king had a design against his life, or at least to set him aside, compared against his sovereign, and put him to death, as is supposed: after which, he usurped the throne, styling himself *Shah Nadir*, or *King Nadir*.

He afterwards laid siege to *Candahor*, of which a son of *Mereweis* had possessed himself. While he lay at this siege, the court of the Great Mogul being distracted with factions, one of the parties invited *Shah Nadir* to come to their assistance, and betrayed the Mogul into his hands. He thereupon marched to *Delhi*, the capital of *India*, and summoned all the viceroys and governors of provinces to attend him, and bring with them all the treasures they could raise; and those that did not bring as much as he expected, he tortured and put to death. Having thus amassed the greatest treasure that ever prince was master of, he returned to *Persia*, giving the Mogul his liberty, on condition of his resigning the provinces on the west side of the *Indus* to the crown of *Persia*. He afterwards made a conquest of *Uzbek Tartary*, and plundered *Bochara* the capital city. Then he marched against the *Dagistan Tartars*; but lost great part of his army in their mountains, without fighting. He defeated the *Turks* in several engagements; but laying siege to *Bagdad*, was twice compelled to raise the siege. He proceeded to change the religion of *Persia* to that of *Omar*, hanged up the chief priests, put his own son to death, and was guilty of such cruelty, that he was at length assassinated by his own relations, anno 1747. A contest upon this ensued between these relations for the crown, which has rendered *Persia* a scene of the most horrible confusion for upwards of 40 years.

The reader will form some notion of the troubles of this unhappy country from the following series of pretenders to the throne between the death of *Nadir* and the accession of *Kerim Khan*. We give it from *Franklin's Observations*.—1st, *Adil Shah*.—2d, *Ibrahim Shah*.—3d, *Shah Rokh Shah*.—4th, *Suleeman Shah*.—5th, *Ismael Shah*.—6th, *Azad Khan Af-*

ghan.—7th, *Hussun Khan Kejar*.—8th, *Ali Merdan Khan Bukhteari*.—9th, *Kerim Khan Zund*.

“ Their reigns, or more properly the length of time they respectively governed with their party, were as follows: *Adil Shah*, nine months. *Ibrahim Shah*, six months. *Shah Rokh Shah*, after a variety of revolutions, at length regained the city of *Mesched*: he is now alive (1787), and above 80 years of age, reigning in *Khorasan*, under the direction of his son *Nussir Ullah Meerza*. *Suleeman Shah* and *Ismael Shah* in about forty days were both cut off, almost as soon as they were elevated. *Azad Khan Afghan*, one of *Kerim Khan's* most formidable rivals and competitors, was subdued by him, brought prisoner to *Shirauz*, and died there a natural death. *Hussun Khan Kejar*, another of *Kerim Khan's* competitors, was besieging *Shirauz*, when his army suddenly mutinied and deserted him. The mutiny was attributed to their want of pay. A party sent by *Kerim Khan* took him prisoner. His head was instantly cut off, and presented to *Kerim Khan*. His family were brought captives to *Shirauz*. They were well treated, and had their liberty given them soon after, under an obligation not to quit the city. *Ali Merdan Khan* was killed by a musket-shot as he was walking on the ramparts of *M. I.* had encouraging his men. *Kerim Khan Zund*, by birth a *Candian*, was a most favourite officer of *Nadir Shah*, and at the time of his death was in the southern provinces. *Shirauz* and other places had declared for him. He found means at last, after various encounters with doubtful success, completely to subdue all his rivals, and finally to establish himself as ruler of all *Persia*. He was in power about 30 years; the latter part of which he governed *Persia* under the appellation of *vakeel* or *regent*, for he never would receive the title of *Shah*. He made *Shirauz* the chief city of his residence, in gratitude for the assistance he had received from its inhabitants and those of the southern provinces. He died in the year 1779, regretted by all his subjects, who esteemed and honoured him as the glory of *Persia*.

“ When the death of *Kerim Khan* was announced in the city, much confusion arose; two and twenty of the principal officers of the army, men of high rank and family, took possession of the ark, or citadel, with a resolution to acknowledge *Abul Futah Khan* (the eldest son of the late *Vakeel*) as their sovereign, and to defend him against all other pretenders; whereupon *Zikea Khan*, a relation of the late *Vakeel* by the mother's side, who was possessed of immense wealth, lifted a great part of the army into his pay, by giving them very considerable bounties. *Zikea Khan* was of the tribe of *Zund* (or the *Lackeries*); a man remarkably proud, cruel, and unrelenting. Having assembled a large body of troops, he immediately marched to the citadel, and laid close siege to it for the space of three days; at the expiration of which, finding he could not take it by force, he had recourse to treachery. To each of the principal khans he sent a written paper, by which he swore upon the *Koran*, that if they would come out and submit to him, not a hair of their heads should be touched, and that they should have their effects secured to them. Upon this a consultation was held by them; and it appearing that they could not submit many days longer, they agreed to surrender

Persia. surrender themselves, firmly relying on the promises that had been made them. Zikea Khan, in the mean time, gave private orders for the khans to be seized, and brought separately before him as they came out of the citadel. His orders were strictly obeyed, and these deluded men were all massacred in his presence: he was seated the whole time, feasting his eyes on the cruel spectacle.

64
Murdered.

"Zikea Khan's tyranny became soon intolerable, and he was cut off by his own body guard, when Abul Futtah Khan, who was at the time in the camp, was proclaimed king by the unanimous voice of the troops, whom he immediately led back to Shirauz. On his arrival he was acknowledged as sovereign by all ranks of people, and took quiet possession of the government.

65
Mahomed Sadick Khan attempts to seize the government,

"Mahomed Sadick Khan, only brother of the late Kerim Khan, who had during that prince's life filled the high office of beglerbeg of Pers, and had been appointed guardian of his son Abul Futtah Khan, was at this period governor of the city of Buffora, which had been taken by the Persians, previous to the vakeel's death. Upon hearing the news of his brother's decease he became ambitious of reigning alone, and from that instant formed schemes for the destruction of his nephew; but as it was necessary for him to be on the spot for the advancement of his views, he determined to withdraw the Persian garrison from Buffora, who were all devoted to his interest: accordingly he evacuated that place, and marched immediately for Shirauz.

"The news of Sadick Khan's approach threw the inhabitants of Shirauz into the greatest consternation: their minds were variously agitated on the occasion; some, from his known public character, expected he would honestly fulfil the commands of his deceased brother; others, who had been witnesses to the confusion of former times, on similar occasions, rightly imagined that he would set up for himself; and indeed this proved to be the case: for having entered Shirauz a very few days after, he caused Abul Futtah Khan to be seized, deprived of sight, and put into close confinement.

66
Which he effects.

"After this event, Sadick Khan openly assumed the government. As soon as the intelligence reached Ali Murad Khan, who was at Ispahan, that lord instantly rebelled: deeming himself to have an equal right to the government with Sadick Khan, as in fact he had, he could ill brook the thought of being obedient to him, and openly declared himself a competitor for the empire. Persia was by this means again involved in all the horrors of a civil war. Ali Murad Khan indeed took possession of Shirauz, assumed the government, and gave to the empire the flattering prospect of being settled under the government of one man; but this prospect was soon obscured by the power and credit acquired by Akau Mahomed Khan."

67
Akau Mahomed Khan collects troops, and is proclaimed at Mazanderan and Ghilan.

On the night following Kerim Khan's death, this man found means to make his escape from Shirauz, and fled to the northward, where collecting some troops, he soon made himself master of Mazanderan and Ghilan, and was proclaimed nearly about the time that Ali Murad Khan had taken Shirauz. "It is remarkable (says our author), that from his first entering into competition for the government, he has been successful in every battle which he has fought. He is an eunuch,

having been made so whilst an infant, by the command of Nadir Shah, but possesses great personal bravery."

Persia.

Ali Murad Khan, hearing of the success of Akau Mahomed Khan, determined to go against him; but as he was previously proceeding to Ispahan to suppress a rebellion, he fell suddenly from his horse and expired on the spot.

"At this period Jaafar Khan, the eldest and only surviving son of Sadick Khan, was governor of Khuma: Khan at he deemed this a favourable opportunity to assert his pretensions to the government, and immediately marched with what few troops he had to Ispahan: soon after his arrival he was joined by the greater part of the malcontents, who were then in arms. In this situation he remained some time; but Akau Mahomed Khan coming down upon him with his army, he was obliged to risk his fate in a battle, and, being defeated, fled with the small remains of his troops, taking the road to Shirauz. Soon after finding himself strengthened by an increase of his army, he determined to venture a second engagement with his opponent Akau Mahomed Khan; and for this purpose marched with his army towards Ispahan: the two armies met near Yezdekhast, when a battle ensued, and Akau Mahomed Khan's superior fortune again prevailing, Jaafar Khan was defeated, and retired to Shirauz, which he quitted on the 25th of June 1787, and shortly after marched his army to the northward, but returned in October without having effected any thing."

Such was the state of Persia in 1788. Mr Franklin, from whose excellent *Observations on a Tour made in the years 1786-7* these particulars are mostly extracted, says that Jaafar Khan is the most "likely, in case of success against his opponent, to restore the country to a happy and reputable state; but it will require a long space of time to recover it from the calamities into which the different revolutions have brought it:—a country, if an oriental metaphor may be allowed, once blooming as the garden of Eden, fair and flourishing to the eye;—now, sad reverse! despoiled and leafless by the cruel ravages of war, and desolating contention."

As to the air and climate of this country, considering the great extent thereof, it cannot but be very different, according to the situation of its several parts; some being frozen with cold, whilst others are burnt with heat at the same time of the year. The air, wherever it is cold, is dry; but where it is extremely hot, it is sometimes moist. All along the coast of the Persian Gulph, from west to east, to the very mouth of the river Indus, the heat for four months is so excessive, that even those who are born in the country, unable to bear it, are forced to quit their houses, and retire to the mountains; so that such as travel in these parts, at that season, find none in the villages but wretched poor creatures, left there to watch the effects of the rich, at the expence of their own health. The extreme heat of the air, as it is insupportable, so it makes it prodigiously unwholesome; strangers frequently falling sick there, and seldom escaping. The eastern provinces of Persia, from the river Indus to the borders of Tartary, are subject to great heats, though not quite so unwholesome as on the coasts of the Indian Ocean and the Persian Gulph; but in the northern provinces, on the coast of the Caspian Sea, the heat

69
Is defeated by Akau Mahomed Khan.

70
Air and climate of Persia.

heat is full as great, and, though attended with moisture, as unwholesome as on the coast before mentioned. From October to May, there is no country in the world more pleasant than this; but the people carry indelible marks of the malign influence of their summers, looking all of them of a faint yellow, and having neither strength nor spirits; though, about the end of April, they abandon their houses, and retire to the mountains, which are 25 or 30 leagues from the sea. But this moistness in the air is only in these parts; the rest of Persia enjoys a dry air, the sky being perfectly serene, and hardly so much as a cloud seen to fly therein. Though it seldom rains, it does not follow that the heat admits of no mitigation; for in the night, notwithstanding there is not a cloud to be seen, and the sky is so clear, that the stars alone afford a light sufficient to travel by, a brisk wind springs up, which lasts until within an hour of the morning, and gives such a coolness to the air, that a man can bear a tolerable warm garment. The seasons in general, and particularly in the middle of this kingdom, happen thus: the winter, beginning in November, and lasting until March, is very sharp and rude, attended with frost and snow; which last descends in great flakes on the mountains, but never in the plains. The climate of Shiraz, the capital of Persia Proper, is represented by a traveller who lately visited it, as one of the most agreeable in the world, the extremes of heat and cold being seldom felt. "During the spring of the year the face of the country appears uncommonly beautiful. The flowers, of which they have a great variety, and of the brightest hues, the fragrant herbs, shrubs, and plants, the rose, the sweet basil, and the myrtle, all here contribute to refresh and perfume the natural mildness of the air. The nightingale of the garden (called by the Persians *boobul bezar dastan*), the goldfinch, and the linnet, by their melodious warblings at this delightful season of the year, serve to add to the satisfaction of the mind, and to inspire it with the most pleasing ideas. The beauties of nature are here depicted in their fullest extent; the natural historian and the botanist would here meet with ample scope for pursuing their favourite investigations. With such advantages, added to the salubrity of the air, how can it be wondered at that the inhabitants of Shiraz should so confidently assert the pre-eminence of their own city to any other in the world?—or that such beauties should fail of calling forth the poetical exertions of a Hafiz, a Sâdi, or a Jâmi? Their mornings and evenings are cool, but the middle of the day is very pleasant. In summer the thermometer seldom rises above 73 in the day-time, and at night it generally sinks as low as 62. The autumn is the worst season of the year, that being the time when the rains begin to fall, and during the autumnal months it is considered by natives as the most unhealthy; colds, fluxes, and fevers being very general. In winter a vast deal of snow falls, and very thick, but ice is rarely to be found, except on the summits of the mountains or towards Isfahan, and the more northern parts of Persia. One thing which is most to be esteemed in this country, and renders it preferable to any other part of the world, is their nights, which are always clear and bright; and the dew, that in most places is of so pernicious and dangerous a nature, is

not of the least ill consequence here: there is none at all in summer, and in the other seasons it is of such a nature, that if the brightest scimitar should be exposed to it all the night, it would not receive the least rust; a circumstance I have myself experienced. This dryness in the air causes their buildings to last a great while, and is undoubtedly one of the principal reasons that the celebrated ruins of Persepolis have endured for so many ages, and, comparatively speaking, in so perfect a state." The great dryness of the air exempts Persia from thunder and earthquakes. In the spring, indeed, there sometimes falls hail; and, as the harvest is then pretty far advanced, it does a great deal of mischief. The rainbow is seldom seen in this country, because there rise not vapours sufficient to form it; but in the night there are seen rays of light shooting thro' the firmament, and followed as it were by a train of smoke. The winds, however brisk, seldom swell into storms or tempests; but, on the other hand, they are sometimes poisonous and infectious on the shore or the Gulph, as all travellers agree. Mr Tavernier says, that at Gomeroon people often and themselves struck by a south wind, in such a manner that they cry, "I burn!" and immediately fall down dead. M. le Brun tells us, that he was assured while he was there, that the weather was sometimes so excessively sultry as to melt the seals of letters. At this time the people go in their shirts, and are continually sprinkled with cold water; and some even lie several hours naked in the water. Among the inconveniences consequent from this malign disposition of the air, one of the most terrible is the engendering, in the arms and legs, a kind of long small worms, which cannot be extracted without great danger of breaking them; upon which a mortification ensues.

The soil of Persia is in general stony, sandy, barren, and everywhere so dry, that, if it be not watered, it produces nothing, not even grass; but, where they can turn the water into their plains and valleys, it is not unfruitful. There is a great difference in point of fertility in the different provinces of the empire; and those of Media, Iberia, Hyrcania, and Bactria, are now in a great measure what they were formerly, and surpass most of the others in their productions. All along the Persian Gulph, the soil is still more barren, cattle less plenty, and every thing in a worse condition than anywhere else.

Though there is scarce a province in Persia which does not produce wine, yet the wine of some provinces is much more esteemed than that of others; but Schiras, or, as it is written by Mr Francklin, *Schirauz*, wine is universally allowed to be the very best in Persia: inasmuch, that it is a common proverb there, That to live happily one must eat the bread of Yezd, and drink the wine of Schiras.

The grain most common in Persia is wheat; which is wonderfully fair and clean. As for barley, rice, and millet, they only make bread of them in some places, as in Courdestan, when their wheat-bread is exhausted before the return of harvest. They do not cultivate in this country either oats or rye; except where the Armenians are settled, who make great use of the latter in Lent. Rice is the universal aliment of all sorts of people in Persia; for this reason they are extremely careful in its cultivation; for, after they have sown it

Persia.

72
Soil.73
Produce,
&c.

Persia

in the same manner as other grain, they in three months time transplant it, root by root, into fields, which are well watered, otherwise it would never attain that perfection in which we find it there; since it is softer, sooner boiled, and more delicious, than the same grain in any other part of the world. Perhaps its taste is, in some measure, heightened by a practice they make use of to give it a glossy whiteness, viz. by cleaning it, after it is beaten out of the husks, with a mixture of flour and salt. Corn ripens exceedingly in this country; so that in some parts they have a threefold crop in the year. The Persian bread is generally very thin, white, and good; and commonly cheap enough.

Metals of all sorts have been found in Persia. Since the reign of Shah Abas the Great, iron, copper, and lead, have been very common; but there are no gold or silver mines open at present; though, as Persia is a very mountainous country, such might very probably be found, if pains were taken to search them out. There are silver mines in Kirman and Mazanderan, and one not far from Spahaw; but they cannot be worked for want of wood. Minerals are also found in Persia in abundance; especially sulphur, saltpetre, salt, and alum. Nothing is more common in this country than to meet with plains, sometimes 10 leagues in length, covered entirely with salt, and others with sulphur or alum. In some places salt is dug out of mines, and even used in building houses. Marble, freestone, and slate, are found in great plenty about Hamadan. The marble is of four colours, viz. white, black, red and black, and white and black. Persia yields two sorts of petroleum, or napthe; namely, black and white. In the neighbourhood of Tauris they find azure; but it is not so good as that brought from Tartary. Among the most valuable productions of Persia are the precious stones called *turquoises*, of which there are several rocks or mines.

The horses of Persia are the most beautiful of the East, though they are not so much esteemed as those of Arabia: so great, however, is the demand for them, that the finest ones will fetch from 90*l.* to 450*l.* sterling. They are higher than the English saddle horses; straight before, with a small head, legs wonderfully slender, and finely proportioned; they are mighty gentle, good travellers, very light and sprightly, and do good service till they are 18 or 20 years old. The great numbers of them sold into Turkey and the Indies, though none can be carried out of the kingdom without special licence from the king, is what makes them so dear. Next to horses we may reckon mules, which are much esteemed here, and are very fine; and next to these we may justly place asses, of which they have in this country two sorts; the first bred in Persia, heavy and doltish, as asses in other countries are; the other originally of an Arabian breed, the most docile and useful creature of its kind in the world. They are used wholly for the saddle; being remarkable for their easy manner of going, and are very sure footed, carrying their heads lofty, and moving gracefully. Some of them are valued at 20*l.* sterling. The mules here are also very fine; they pace well, never fall, and are seldom tired. The highest price of a mule is about 45*l.* sterling. Camels are also numerous in Persia, and very serviceable: they call them *keekty-krouch-konion*, i. e. "the ships of the land;" because the inland trade is

carried on by them as the foreign is by ships. Of these camels there are two sorts, the northern and southern: the latter, which is much the smaller, but swifter, will carry a load of about 700 weight, and trot as fast as a horse will gallop; the other will travel with a load of 1200 or 1300 weight; both are profitable to their masters, as costing little or nothing to keep. They travel without halter or reins; grazing on the road from time to time, notwithstanding their load. They are managed entirely by the voice; those who direct them making use of a kind of song, and the camel moving brisker, or at its ordinary pace, as they keep a quicker or slower time. The camels shed their hair so clean in the spring, that they look like scalded swine; but then they are pitched over, to keep the flies from stinging them. The camels hair is the most profitable fleece of all the tame beasts: fine stuffs are made of it; and in Europe, hats, with a mixture of a little beaver.

As beef is little eaten in Persia, their oxen are generally employed in ploughing, and other sorts of labour. Hogs are nowhere bred in Persia, if we except a province or two on the borders of the Caspian Sea. Sheep and deer are very common throughout all Persia.

Of wild beasts, the number is not great in that country, because there are few forests; but where there are any, as in Hyrcania, now called *Tabrislan*, abundance of lions, bears, tigers, leopards, porcupines, wild boars, and wolves, are to be found; but the last are not so numerous as any of the other species.

There are but few insects in this country; which may be ascribed to the dryness of the climate. In some provinces, however, there is an infinite number of locusts or grasshoppers, which fly about in such clouds as to darken the air. In certain parts of the Persian dominions they have large black scorpions, so venomous, that such as are stung by them die in a few hours. In others they have lizards, frightfully ugly, which are an ell long, and as thick as a large toad, their skins being as hard and tough as that of the sea-dog: they are said to attack and kill men sometimes; but that may be doubted. The southern provinces are infested with gnats; some with long legs, like those we call *malger*; and some white, and as small as fleas, which make no buzzing, but sting suddenly, and so smartly, that the sting is like the prick of a needle. Among the reptiles is a long square worm, called by the inhabitants *kazar-pek*, i. e. "thousand feet," because its whole body is covered with feet; it runs prodigiously fast; and its bite is dangerous, and even mortal, if it gets into the ear.

There are in Persia all the several sorts of fowls which we have in Europe, but not in such great plenty; excepting, however, wild and tame pigeons, of which vast numbers are kept all over the kingdom, chiefly on account of their dung: which is the best manure for melons. It is a great diversion among the lower sort of people in town and country to catch pigeons, though it be forbidden: for this purpose they have pigeons so taught, that, flying in one flock, they surround such wild ones as they find in the field, and bring them back with them to their masters. The partridges of this country are the largest and finest in the world, being generally of the size of our fowls. Geese, ducks, cranes, herons,

herons, and many other sorts of water-fowl, are common here; as are likewise nightingales, which are heard all the year, but chiefly in the spring; martlets, which learn whatever words are taught them; and a bird called *noura*, which chatters incessantly, and repeats whatever it hears. Of birds of a larger size, the most remarkable is the pelican, by the Persians called *tacab*, i. e. "water-carrier;" and also *misc*, i. e. "sheep;" because it is as large as one of those animals*. There are in Persia various birds of prey. Some of their falcons are the largest and finest in the world: the people take great pains to teach them to fly at game; the Persian lords being great lovers of falconry, and the king having generally 800 of this sort of birds, each of which has a person to attend it.

There is perhaps no country in the world which, generally speaking, is more mountainous than Persia; but many of them yield neither springs nor metals, and but few of them are shaded with trees. It is true, some of the chief of them are situated on the frontiers, and serve as a kind of natural ramparts, or bulwarks, to this vast empire. Among the latter are the mountains of Caucasus and Ararat, sometimes called the *mountains of Daghestan*, which fill all the space between the Euxine and Caspian seas: those called *Taurus*, and the several branches thereof, run through Persia from Natolia to India, and fill all the middle of the country.

As to rivers, except the Araxes, which rises in the mountains of Armenia, and falls into the Kur or Cyrus before it reaches the Caspian Sea, there is not one navigable stream in this country. The Oxus divides Persia on the north east from Ubeck Tartary. The Indus also may now be reckoned among the rivers of Persia, as the provinces lying to the west of that river are now in possession of that crown: this river is said to run a course of more than 1000 miles, and overflows all the low grounds in April, May, and June.

The seas on the south of Persia are, the Gulph of Persia or Bassora, the Gulph of Ormus, and the Indian Ocean. The only sea on the north is the Caspian, or Hyrcanian sea; which is more properly a lake, having no communication with any other sea. These seas, together with the lakes and rivers, supply Persia with plenty of fish. The Caspian sea contains very fine fish on one side; and the Persian Gulph on the other is believed to have more fish than any other sea in the world. On the coasts of this gulph is taken a sort of fish, for which they have no particular name: its flesh is of a red colour, very delicious, and some of them weigh 200 or 300 pounds. The river fish are chiefly barbel; but far from being good. Those of the lakes are carps and shads. In the river at Spaubown are a great number of crabs, which crawl up the trees, and live night and day under the leaves, whence they are taken; and are esteemed very delicious food.

In his voyage from Gombroon up the Persian Gulph, Mr Ives makes mention of several islands, named Kisme, Poilour, Kyes, Inderalie, Shintewar, and Bussaeel. Some of these were quite barren; on others there were a few trees and bushes, with little fishing towns, and a few small vessels lying along shore. The date trees were thinly scattered among the hills; but tho' a small portion of green might here and there be discovered, yet such was the barrenness of these islands in

general, that it was for some time a matter of surprise how sheep and goats could possibly subsist upon them. On closer examination, however, it was found, that the soil produced a kind of small-leaved juicy mallows, on which these animals principally feed. The Persian coast, as they sailed along, afforded a most romantic prospect, appearing at first to be one continued rock, rent and torn asunder by earthquakes; but it was afterwards discovered, that some part of it was only sand hardened by the rains and sun.

Narban Point terminates in a long and low piece of land, which runs off into the gulph from the foot of the Persian hills. Between this point and the main land is a channel, in which a ship of 900 tons burden might easily ride. The Portuguese had formerly a settlement here, the remains of which are still to be seen. A large river empties itself into the sea at this place; and Mr Ives observes, that "Providence seems here to have allotted a spot of ground amidst inhospitable rocks and deserts, capable of affording the kind production of vegetables for man and beast." The adjacent country is subject to the Arabs.

Through all the Persian Gulph Mr Ives remarks, that the spring-water on the islands is much better than that on the continent; and the water nearest the sea on the islands has greatly the advantage over that which is found in the middle parts. This holds good, however, only in those parts which are near the sea; for about 12 miles up the country, both on the Persian and Arabian side of the gulph, the water is very good. At the island called Baren or Baharen, divers go down to the bottom of the sea, at certain known depths, and come up again with their vessels filled with fresh water. This fresh water is found in holes or little natural wells, some fathoms below the surface of the sea. The Arabs have certain marks on the island to teach them where to dive for the fresh water. Mr Ives was assured by an Arabian merchant, that he himself had discovered a spring upon the shore, by which one of these wells was served. He put into this spring a bit of a heavy dick; and in two or three days an Arabian diver brought it to him again from the bottom of one of these holes.

The English, and other nations, trade with the Persians several ways, particularly by the gulph of Ormus at Gombroon, and by the way of Turkey. A trade also was not many years since opened by the English with Persia through Russia and the Caspian Sea; but that is now discontinued, having been prohibited by the court of Russia, who were apprehensive that the English would teach the Persians to build ships, and dispute the navigation of the Caspian Sea with them. The principal commodities and manufactures of Persia are, raw and wrought silks, mohair camlets, carpets, leather; for which, and some others, the European merchants exchange chiefly woollen manufactures; but the trade is carried on altogether in European shipping, the Persians having scarce any ships of their own, and the Russians the sole navigation of the Caspian Sea. There is not a richer or more profitable trade in the world, than that which is carried on between Gombroon and Surat in the East Indies; and the English East India company frequently let out their ships to transport the merchandise of the Banians and Armenians from Persia to India. The shah, or so-

Persia.

*6
Trade.

Persia.

verign of Persia, is the chief merchant; and he usually employs his Armenian subjects to traffic for him in every part of the world. The king's agents must have the refusal of all merchandize, before his subjects are permitted to trade. It is computed that Persia produces yearly upwards of 22,000 bales of silk, chiefly in the provinces of Ghilan and Mazanderan, each bale weighing 263 pounds. Vast quantities of Persian silk used to be imported into Europe, especially by the Dutch, English, and Russians, before the civil wars began. The goods exported from Persia to India are, tobacco, all sorts of fruits, pickled and preserved, especially dates, marmalade, wines, distilled waters, horses, Persian leathers, and Turkey leather of all sorts and colours, a great quantity whereof is also exported to Moscow and other European countries. The exports to Turkey are, tobacco, galls, thread, goats hair, stuffs, mats, box-work, and many other things. As there are no ports in the east, and trading by commission, with the use of bills of exchange, is little known, traffic must proceed in a very awkward heavy manner, in comparison of that of Europe.

77
Money.

The most current money of Persia are the abassees, worth about 1 s. 4 d. sterling; they are of the finest silver. An abassee is worth two mahmoudes; a mahmoud, two shahes; and a shahes, ten single or five double casbeghes: these last pieces are of brass, the others of silver; for gold is not current in trade. The shahes are not very common; but mahmoudes and casbeghes are current everywhere. Horses, camels, houses, &c. are generally sold by the toman, which is an imaginary coin, worth 200 shahes, or 50 abassees; and they usually reckon their estates that way. Such a one, they say, is worth so many tomans, as we say pounds in England.

78
Govern-
ment.

Persia is an absolute monarchy, the lives and estates of the people being entirely at the disposal of their prince. The king has no council established, but is advised by such ministers as are most in favour; and the resolutions taken among the women of the harem frequently defeat the best laid designs. The crown is hereditary, excluding only the females. The sons of a daughter are allowed to inherit. The laws of Persia exclude the blind from the throne; which is the reason that the reigning prince usually orders the eyes of all the males of the royal family, of whom he has any jealousy, to be put out. The king has generally a great many wives, which it would be death for any one, besides the eunuchs, who have the superintendence of them, to look at, or even see by accident; wherefore, when he travels, notice is given to all men to quit the road, nay their very houses, and to retire to a great distance.

The prime minister is called *attemaet doulet*, which signifies the director of the empire, and also *vizir azem*, or the great supporter of the empire; as he alone almost sustains the whole weight of the administration. This minister's chief study is to please his master, to secure to himself an ascendancy over his mind, and to avoid whatever may give him any uneasiness or umbrage. With this view, he never fails to flatter him, to extol him above all the princes upon earth, and to throw a thick veil over every thing that might help to open his eyes, or discover to him the weakness of the state. He even takes particular care to keep the king in utter

ignorance, to hide from him, or at least to soften, all unwelcome news; and, above all, to exalt immoderately every the least advantage he obtains over his enemies. As he takes these methods, which indeed are and must be taken, more or less, by the ministers of every despotic prince, to secure the favour and confidence of his master; so the inferior officers and governors of provinces are obliged to employ all the means in their power to secure the prime minister's, they depending no less upon him than he does upon the king. There is a gradation of despotism and slavery, down from the prime minister to the lowest retainer to the court, or dependent on the government. Children are sometimes in Persia required by the king to cut off the ears and nose, and even to cut the throats of their parents: and these orders cannot be objected to, without endangering their own lives. Indeed their baseness and mercenariness are such, that they will perpetrate such atrocious deeds without the least scruple or difficulty, when they have a promise or expectation of possessing their posts. The prime ministers, notwithstanding the precarious footing on which they stand, in effect of their abilities or good fortune, sometimes continue in their employments during life, or, if removed, are only banished to some city, where they are allowed to spend the remainder of their days in a private station.

Next to the prime minister are the nadir, or grand-master of the household; the mehter, or groom of the chambers, who is always a white eunuch; the mir-akbor-bashe, or master of the horse; the mir-shikar-bashe, or great huntsman and falconer; the divan-beggi, or chief justice, to whom there lies an appeal from the deroga, or the lieutenant of police, in every town; the vacka-nuviez, or recorder of events, or first secretary of state; the musta-she-el-menealeck, or master of the accounts and finances of the kingdom; the numes-humbashes, or the king's chief physicians; the sheickada shashe, or inspector of the palace, and regulator of rank at court; and the khans, or governors of provinces, under whom are other governors, called *soitans*, appointed also by the king.

Civil matters are all determined by the eazi, and ecclesiastical ones (particularly divorces) by the sheick-el-felleum, or head of the faith; an officer answering to the musti among the Turks; under him are the sheick-el-felom, and cadi, who decide in all matters of religion, and make all contracts, testaments, and other public deeds, being appointed by the king in all the principal towns; and next to these are the pichnamas, or directors of the prayers; and the moullahs, or doctors of the law.

Justice is carried on in Persia in a very summary manner; the sentence, whatever it may be, being always put into execution on the spot. Theft is generally punished with the loss of nose and ears; robbing on the road, by ripping up the belly of the criminal, in which situation he is exposed upon a gibbet in one of the most public parts of the city, and there left until he expires in torment.

There is no nobility in Persia, or any respect shown to a man on account of his family, except to those who are of the blood of their great prophet or patriarchs; but every man is esteemed according to the post he possesses; and when he is dismissed, he loses

his

his honour, and he is no longer distinguished from the vulgar

With respect to the forces of Persia, their two bodies, called the *Kortshies* and *Goulans*, that serve on horseback, are well kept and paid, and may amount, the former to about 22,000, and the latter to about 18,000. The *Kortshies* are descended from an ancient but foreign race; and the *Goulans* are either Georgian renegadoes or slaves, or the children of slaves of all nations. The infantry, called *Tangtchies*, are picked out from among the most robust and vigorous of the peasants, and compose a body of 40,000 or 50,000. The Persians have few fortified towns, and had no ships of war, till Kouli Khan built a royal navy, and among them had a man of war of 80 guns; but since the death of that usurper, we hear no more of their fleet.

The arms of the king of Persia are a lion couchant, looking at the sun as he rises over his back. His usual title is *Shah* or *Pajbaru*, the "disposer of kingdoms." They add also to the king's titles those of *sultan*, and *chan* or *cham*, which is the title of the Tartar sovereigns. To acts of state the Persian monarch does not subscribe his name; but the grant runs in this manner, viz. *This act, or edict, is given by him whom the universe obeys.*

The ancient Persians are known to have been exceedingly voluptuous and effeminate. After the conquest of the empire by Alexander, the Greek discipline and martial spirit being in part communicated to them, they became much more formidable; and hence the Parthians were found to be a match not only for the Syro-Macedonian princes, but even for the Romans. Of their manners we know little or nothing, but that to their valour and military skill they joined in a surprising degree all the luxury and dissipation of the ancient Persians.

The modern Persians, like the Turks, plundering all the adjacent nations for beauties to breed by, are men of a good stature, shape, and complexion; but the Gaures, or ancient Persians, are homely, ill-shaped, and clumsy, with a rough skin, and olive complexions. In some provinces, not only the complexions but the constitutions of the inhabitants, suffer greatly by the extreme heat and unwholesomeness of the air. The Persian women, too, are generally handsome and well-shaped, but much inferior to those of Georgia and Circassia. The men wear large turbans on their heads, some of them very rich, interwoven with gold and silver; a vest, girt with a sash; and over it a loose garment, something shorter; with sandals, or slippers, on their feet. When they ride, which they do every day, if it be but to a house in the same town, they wear pliant boots of yellow leather; the furniture of their horses is extremely rich, and the stirrups generally of silver: whether on horseback or on foot, they wear a broad sword and a dagger in their sash. The dress of the women does not differ much from that of the men; only their vests are longer, and they wear stiffened caps on their heads, and their hair down.

With respect to outward behaviour, says an intelligent traveller, "The Persians are certainly the Persians of the East. Whilst a rude and insolent demeanor peculiarly marks the character of the Turkish nation towards foreigners and Christians, the behaviour of

the Persians would, on the contrary, do honour to the most civilized nations: they are kind, courteous, civil, and obliging, to all strangers, without being guided by those religious prejudices so very prevalent in every other Mahometan nation; they are fond of inquiring after the manners and customs of Europe, and in return very readily afford any information in respect to their own country. The practice of hospitality is with them so grand a point, that a man thinks himself highly honoured if you will enter his house and partake of what the family affords; whereas, going out of a house without smoking a calcan, or taking any other refreshment, is deemed in Persia a high affront."

Their usual drink is water and sherbet, as in other Mahometan countries, wine being prohibited; but of all Mahometan nations, they pay the least regard to this prohibition. Many of them drink wine publicly, and almost all of them in private (excepting those who have performed the pilgrimage to Mecca, and men of religion): they also are very liable to be quarrelsome when inebriated, which is often attended with fatal consequences. They eat opium, but in much less quantities than the Turks; and indeed in every thing they say or do, eat or drink, they make a point to be as different from this nation as possible, whom they detest to a man, beyond measure; esteeming Jews and Christians superior to them, and much nearer to salvation.

Every one knows, that the religion of the Persians is Mahometan; and that they are of the sect of Ali, for whom they entertain the most extravagant veneration. Mr Francklin heard one of his guides on the road reprove another for the expression *O God! O Ali!* "No, no (said his zealous companion), *Ali first, God second!*" This attachment is the source of their hatred to the Turks, and of many strange customs among themselves, which we have not room to enumerate; a few, however, must be mentioned.

"Their mode of living is as follows: They always rise at daybreak, in order to perform their devotions. Their first prayer is denominated *numaz soobb*, or the morning prayer; it is said before sunrise, after which they eat a slight meal called *na'shta* or breakfast; this consists of grapes, or any other fruits of the season, with a little bread, and cheese made of goat's milk; they afterwards drink a cup of very strong coffee without milk or sugar; then the calcan or pipe is introduced. The Persians, from the highest to the lowest ranks, all smoke tobacco.

"Their second hour of prayer is called *numaz xò-bur*, or mid-day prayer, and is always repeated when the sun declines from the meridian. Their dinner, or *chàst*, which is soon after this prayer, consists of curds, bread, and fruits of various kinds; animal food not being usual at this meal.

"The third hour of prayer is called *numaz àfur*, or the afternoon prayer, said about four o'clock.

"The fourth hour of prayer is *numaz shàm*, or evening prayer, which is said after sun set; when this is finished, the Persians eat their principal meal, called *shàmi* or supper. This generally consists of a pilau, dressed with rich meat sauces, and highly seasoned with various spices: sometimes they eat *kibàb* or roast meat. When the meal is ready, a servant brings notice thereof, and at the same time presents a ewer and water;

Perſia. they then waſh their hands, which is an invariable cuſtom with the Perſians both before and after eating. They eat very quick, conveying their food to their mouths with their fingers; the uſe of knives and forks being unknown in Perſia. Sherbets of different ſorts are introduced, and the meal concludes with a deſert of delicious fruits. The ſupper being finiſhed, the family ſit in a circle, and entertain each other by relating pleaſant ſtories (of which they are exceſſively fond), and alſo by repeating paſſages from the works of their moſt favourite poets, and amuſing themſelves at various kinds of games. The fifth and laſt prayer is ſtyled *numaz akbir*, the laſt prayer; or ſometimes *numaz ſheeb*, or the night prayer, repeated about an hour after ſupper."

81
Remark-
able law
reſpecting
marriage.

The moſt remarkable law among the Perſians reſpects marriage. A man may divorce his wife when he chooſes, without aſſigning any other reaſon for the divorce than that it is his pleaſure. If he ſhould change his mind, he may again marry her, divorce her a ſecond time, and a third time marry her; but here this privilege ſtops. No man is allowed to marry the woman whom he has thrice divorced. A widow is obliged to mourn four months for her deceaſed huſband before ſhe can be married to another; but a concubine may form a new connection the inſtant that her keeper expires.

82
Ceremony
of naming
their chil-
dren.

At the naming of children in Perſia, Mr Franklin informs us that the following ceremony is obſerved: "The third or fourth day after the child is born, the friends and relations of the woman who has lain-in aſſemble at her houſe, attended by muſic and dancing girls hired for the occaſion; after playing and dancing ſome time, a mullah or prieſt is introduced, who, taking the child in his arms, demands of the mother what name ſhe chooſes the infant ſhould be called by; being told, he begins praying, and after a ſhort time applies his mouth cloſe to the child's ear, and tells him diſtinctly three times (calling him by name) to remember and be obedient to his father and mother, to venerate his Koran and his prophet, to abſtain from thoſe things which are unlawful, and to pracliſe thoſe things which are good and virtuous. Having repeated the Mahometan profeſſion of faith, he then redelivers the child to his mother; after which the company are entertained with ſweetmeats and other reſhments, a part of which the females preſent always take care to carry away in their pockets, believing it to be the infallible means of their having offspring themſelves."

83
Intellectual
excellence.

The Perſians excel more in poetry than any other ſort of literature; and aſtologers are now in as great reputation in Perſia as the magi were formerly. Their books are all manuſcripts, the art of printing having not yet been introduced among them: they excel indeed in writing, and have eight different hands. They write from the righthand to the left, as the Arabs do. In their ſhort-hand, they uſe the letters of the alphabet; and the ſame letters, differently pointed, will have 20 different ſignifications. In ſhort, the Perſians are born with as good natural parts as any people in the Eaſt, but make a bad uſe of them; being great diſſemblers, cheats, liars, and flatterers, and having a ſtrong propenſity to voluptuouſneſs, luxury, idleneſs, and in-

dolence; vices indeed to which the Aſiatics in general are much addicted.

PERSIAN WHEEL. See HYDROSTATICS.

PERSICA, the PEACH, is by Linnæus referred to the ſame claſs and genus with amygdalus; however, as they are ſo commonly reckoned to be different genera, we have thought proper to diſtinguiſh them. There are a great variety of peach-trees planted in the gardens, ſome of which are preferred only for the beauty of their flowers, but moſt of them for the ſake of the fruit. Of thoſe remarkable for the beauty of their flowers the principal are, 1. The vulgaris, or common peach-tree, with double flowers, which is a very great ornament in gardens, producing very large double flowers of a beautiful red or purple colour, and growing to a conſiderable ſize. 2. The humilis, or dwarf-almond. 3. The africana, or double-flowering dwarf-almond. Theſe two reach not above the height of three or four feet, though their flowers are of equal beauty with the former.

Of the peach-trees cultivated for the ſake of their fruit there are a great number, to deſcribe which particularly would exceed the proper bounds of this article. They are raiſed from the ſtones of the fruit, which ſhould be planted in autumn on a bed of light dry earth, about three inches deep and four inches aſunder. In the winter the beds ſhould be covered with mulch to protect them from the froſt. In this bed they ſhould remain for a year; when they are to be taken up and planted in a nursery, where they are to remain one or two years; after which they muſt be removed to the places where they are to continue.

PERSICANA, in botany. See POLYGONUM.

PERSICUS SINUS, in anc. geogr. (Mela, Pliny); a part of the ſea which the Romans called *Mare Rubrum*, and the Greeks *Mare Erythraum*; waſhing Arabia Felix on the eaſt, between which and Carmania, entering into the land, it waſhes Perſia on the ſouth. Its large mouth conſiſts of ſtraight ſides, like a neck, and then the land retiring equally a vaſt way, and the ſea ſurrounding it in a large compaſs of ſhore, there is exhibited the figure of a human head (Mela). Theophrastus calls this bay *Sinus Arabicus*, a name it equally claims with *Perſicus*, only for diſtinction ſake *Perſicus* is appropriated to it by others.

PERSIMON. See DIOSPYROS.—From the perſimon is made a very palatable liquor in the following manner: As ſoon as the fruit is ripe, a ſufficient quantity is gathered, which is very eaſy, as each tree is well ſtocked with them. Theſe perſimon apples are put into a dough of wheat or other flour, formed into cakes, and put into an oven, in which they continue till they are quite baked and ſufficiently dry, when they are taken out again: then, in order to brew the liquor, a pot full of water is put on the fire, and ſome of the cakes are put in: theſe become ſoft by degrees as the water grows warm, and crumble in pieces at laſt; the pot is then taken from the fire, and the water in it well ſtirred about, that the cakes may mix with it: this is then poured into another veſſel, and they continue to ſteep and break as many cakes as are neceſſary for a brewing: the malt is then infuſed, and they proceed as uſual with the brewing. Beer thus prepared is reckoned much preferable to other beer. They like-
wife

Persius,
Persius.

wife make brandy of this fruit in the following manner: having collected a sufficient quantity of persimons in autumn, they are altogether put into a vessel, where they lie for a week till they are quite soft: then they pour water on them, and in that state they are left to ferment of themselves, without promoting the fermentation by any addition. The brandy is then made in the common way, and is said to be very good, especially if grapes (in particular of the sweet sort), which are wild in the woods, be mixed with the persimon fruit. Some persimons are ripe at the end of September, but most of them later, and some not before November and December, when the cold first overcomes their acrimony. The wood of this tree is very good for joiners instruments, such as planes, handles to chisels, &c. but if after being cut down it lies exposed to sunshine and rain, it is the first wood which rots, and in a year's time there is nothing left but what is useless. When the persimon trees get once into a field, they are not easily got out of it again, as they spread so much.

PERSIS, a Roman lady, whom St Paul salutes in his epistle to the Romans (xvi. 12.), and whom he calls his beloved sister. He says she has laboured much for the Lord, and still labours. Nothing else of her life is come to our knowledge, nor do we know that she is honoured by any church; which is something singular.

PERSIUS (Flaccus Aulus), a Latin poet in the reign of Nero, celebrated for his satires. He was born, according to some, at Volterra in Tuscany; and according to others, at Tigulia, in the gulf Della Specia, in the year 34. He was educated till 12 years old at Volterra; and afterwards continued his studies at Rome under Palæmon the grammarian, Virginius the rhetorician, and Cornutus the Stoic philosopher, who contracted a friendship for him. Persius consulted that illustrious friend in the composition of his verses. Lucian also studied with him under Cornutus; and appeared so charmed with his verses, that he was incessantly breaking out into acclamations at the beautiful passages in his satires: an example rarely seen in poets of equal rank. He was a steady friend, a good son, an affectionate brother and parent. He was chaste, meek, and modest: which shows how wrong it is to judge of a man's morals by his writings; for the satires of Persius are not only licentious, but sharp and full of bitterness. He wrote but seldom; and it was some time before he applied himself regularly to it.

Persius was of a weak constitution, and troubled with a bad stomach, which was the cause of his death in the 30th year of his age. Six of his satires remain; in their judgments of which the critics have been much divided, excepting as to their obscurity, Persius being indeed the most obscure of all the Latin poets. As a poet, he is certainly inferior to Horace and Juvenal; and all the labours of Isaac Casaubon, who has written a most learned and elaborate commentary upon him, cannot make him equal to either of them as a satirist, though in virtue and learning he exceeded them both. He was a professed imitator of Horace; yet had little of Horace's wit, ease, and talent at ridicule. His style is grand, figurative, poetical, and suitable to the dignity of the Stoic philosophy: and hence he shines most in recommending virtue and integrity: here it is

that satire becomes him. He was too grave to court the muses with success: but he had a great soul, susceptible of noble sentiments, which give a grace but to indifferent poetry. His contemporaries thought highly of him. Quintilian allows, that Persius, although he wrote but one book of satires, acquired a great deal of true glory, *Multum et vera gloriæ quamvis uno libro Persius meruit*: and Martial says much the same thing, *Sapius in libro memoratur Persius uno*, &c.

PERSON, an individual substance of a rational intelligent nature. Thus we say, an ambassador represents the person of his prince; and that, in law, the father and son are reputed the same person.

The word *person*, *persona*, is thought to be borrowed a *personando*, from personating or counterfeiting; and is supposed to have first signified a mask: because, as Boethius informs us, *in larva concava sonus volvatur*: and hence the actors who appeared masked on the stage were sometimes called *larvati* and sometimes *personati*. He likewise says, that as the several actors represented each a single individual person, *viz.* Oedipus, or Chremes, or Hecuba, or Medea; for this reason, other people, who were at the same time distinguished by something in their form, character, &c. whereby they might be known, came likewise to be called by the Latins *personæ*, and by the Greeks προσωπα. Again, as actors rarely represented any but great and illustrious characters, the word came at length to import the mind, as being that whose dispositions constitute the character. And thus men, angels, and even God himself, were called *persons*. Things merely corporeal, as a stone, a plant, or a horse, were called *hypostasæ* or *supposita*, but never *persons*. Hence the learned suppose, that the same name *person* came to be used to signify some dignity, whereby a *person* is distinguished from another; as a father, husband, judge, magistrate, &c. In this sense we are to understand that of Cicero: "Cæsar never speaks of Pompey but in terms of honour and respect: he does many hard and injurious things, however, against his person."

Person we have already defined to mean an individual substance of a reasonable nature. Now a thing may be individual two ways: 1. Logically, because it cannot be predicated of any other; as Cicero, Plato, &c. 2. Physically; in which sense a drop of water, separated from the ocean, may be called an individual. Person is an individual nature in each of these senses: logically, according to Boethius, because *person* is not spoken of universals, but only of singulars and individuals; we do not say the *person* of an animal or a man, but of Cicero and Plato: and physically, since Socrates's hand or foot are never considered as persons. This last kind of individual is denominated two ways: positively, when the person is said to be the whole principle of acting; for to whatever thing action is attributed, that the philosophers call a *person*: and negatively, as when we say, with the Thomists, &c. that a person consists in this, that it does not exist in another as a more perfect being. Thus a man, though he consists of two different things, *viz.* body and spirit, is not two persons; because neither part of itself is a complete principle of action, but one person, since the manner of his consisting of body and spirit is such as constitutes one whole principle of action; nor does he exist in any other as a more perfect being; as, for example,

Person.

Person
||
Per. sy.
ing

example, Socrates's foot does in Socrates, or a drop of water in the ocean.

PERSON, in grammar, a term applied to such nouns or pronouns as, being either prefixed or understood, are the nominatives in all inflections of a verb; or it is the agent or patient in all finite or personal verbs. See GRAMMAR.

PERSONAL, any thing that concerns, or is restrained to, the person: thus it is a maxim in ethics, that all faults are personal.

PERSONAL Action, in law, is an action levied directly and solely against the person; in opposition to a real or mixed action. See ACTION.

PERSONAL Goods, or **Chattels**, in law, signifies any moveable thing belonging to a person, whether alive or dead. See CHATTELS.

PERSONAL Identity. See METAPHYSICS, Part III. Chap. iii.

PERSONAL Verb, in grammar, a verb conjugated in all the three persons; thus called in opposition to an impersonal verb, or that which has the third person only.

PERSONALITY, in the schools, is that which constitutes an individual a distinct person.

PERSONATÆ, is the name of the 40th order in Linnæus's Fragments of a Natural Method, consisting of a number of plants whose flowers are furnished with an irregular gaping or grinning petal, which in figure somewhat resembles the snout of an animal. The bulk of the genera of this natural order arrange themselves under the class and order didynamia angiospermia of the Sexual Method.

The rest, although they cannot enter into the artificial class just mentioned, for want of the classic character, the inequality of the stamina; yet, in a natural method, which admits of greater latitude, may be arranged with those plants which they resemble in their habit and general appearance, and particularly in the circumstances expressed in that title.

PERSONIFYING, or **PERSONALIZING**, the giving an inanimate being the figure, sentiments, and language of a person.

Dr Blair, in his Lectures on Rhetoric, gives this account of personification. "It is a figure, the use of which is very extensive, and its foundation laid deep in human nature." At first view, and when considered abstractly, it would appear to be a figure of the utmost boldness, and to border on the extravagant and ridiculous. For what can seem more remote from the track of reasonable thought, than to speak of stones and trees, and fields and rivers, as if they were living creatures, and to attribute to them thought and sensation, affections and actions? One might imagine this to be no more than childish conceit, which no person of taste could relish. In fact, however, the case is very different. No such ridiculous effect is produced by personification when properly employed; on the contrary, it is found to be natural and agreeable, nor is any very uncommon degree of passion required in order to make us relish it. All poetry, even in its most gentle and humble forms, abounds with it. From prose it is far from being excluded; nay, in common conversation, very frequent approaches are made to it. When we say, the ground *thirsts* for rain, or the earth *smiles* with plenty; when we speak of ambition's

being *restless*, or a disease being *deceitful*; such expressions show the facility with which the mind can accommodate the properties of living creatures to things that are inanimate, or to abstract conceptions of its own forming.

"Indeed, it is very remarkable, that there is a wonderful proneness in human nature to animate all objects. Whether this arises from a sort of assimilating principle, from a propensity to spread a resemblance of ourselves over all other things, or from whatever other cause it arises, so it is, that almost every emotion which in the least agitates the mind bestows upon its object a momentary idea of life. Let a man, by an unwary step, sprain his ankle, or hurt his foot upon a stone, and in the ruffled discomposed moment he will sometimes feel himself disposed to break the stone in pieces, or to utter passionate expressions against it, as if it had done him an injury. If one has been long accustomed to a certain set of objects, which have made a strong impression on his imagination; as to a house, where he has passed many agreeable years; or to fields, and trees, and mountains, among which he has often walked with the greatest delight; when he is obliged to part with them, especially if he has no prospect of ever seeing them again, he can scarce avoid having somewhat of the same feeling as when he is leaving old friends. They seem endowed with life. They become objects of his affection; and, in the moment of his parting, it scarce seems absurd to him to give vent to his feeling in words, and to take a formal adieu.

"So strong is that impression of life which is made upon us, by the more magnificent and striking objects of nature especially, that I doubt not in the least of this having been one cause of the multiplication of divinities in the heathen world. The belief of dryads and naiads, of the genius of the wood and the god of the river, among men of lively imaginations, in the early ages of the world, easily arose from this turn of mind. When their favourite rural objects had often been animated in their fancy, it was an easy transition to attribute to them some real divinity, some unseen power or genius which inhabited them, or in some peculiar manner belonged to them. Imagination was highly gratified, by thus gaining somewhat to rest upon with more stability; and when belief coincided so much with imagination, very slight causes would be sufficient to establish it.

"From this deduction may be easily seen how it comes to pass that personification makes so great a figure in all compositions where imagination or passion have any concern. On innumerable occasions it is the very language of imagination and passion; and therefore deserves to be attended to, and examined with peculiar care. There are three different degrees of this figure, which it is necessary to remark and distinguish, in order to determine the propriety of its use. The first is, when some of the properties or qualities of living creatures are ascribed to inanimate objects; the second, when those inanimate objects are introduced as acting like such as have life; and the third, when they are represented either as speaking to us, or as listening to what we say to them."

The ingenious professor goes on to investigate the nature of personification at considerable length. We shall

Personifying shall give his caution for the use of it in prose compositions, in which he informs us this figure requires to be used with great moderation and delicacy. "The same liberty is not allowed to the imagination there as in poetry. The same assistances cannot be obtained for raising passion to its proper height by the force of numbers and the glow of style. However, addresses to inanimate objects are not excluded from prose; but have their place only in the higher species of oratory. A public speaker may on some occasions very properly address religion or virtue; or his native country, or some city or province, which has suffered perhaps great calamities, or been the scene of some memorable action. But we must remember, that as such addresses are among the highest efforts of eloquence, they should never be attempted unless by persons of more than ordinary genius: for if the orator fails in his design of moving our passions by them, he is sure of being laughed at. Of all frigid things, the most frigid are the awkward and unseasonable attempts sometimes

Personifying made towards such kinds of personification, especially if they be long continued. We see the writer or speaker toiling and labouring to express the language of some passion which he neither feels himself nor can make us feel. We remain not only cold, but frozen; and are at full leisure to criticise on the ridiculous figure which the personified object make, when we ought to have been transported with a glow of enthusiasm. Some of the French writers, particularly Bossuet and Flechier, in their sermons and funeral orations, have attempted and executed this figure not without warmth and dignity. Their works are exceedingly worthy of being consulted for instances of this and of several other ornaments of style. Indeed the vivacity and ardour of the French genius is more suited to this bold species of oratory, than the more correct but less animated genius of the British, who in their prose works very rarely attempt any of the high figures of eloquence."

P E R S P E C T I V E.

PERSPECTIVE is the art of drawing on a plane surface true resemblances or pictures of objects, as the objects themselves appear to the eye from any distance and situation, real or imaginary.

It was in the 16th century that *Perspective* was revived, or rather reinvented. It owes its birth to painting, and particularly to that branch of it which was employed in the decorations of the theatre, where landscapes were properly introduced, and which would have looked unnatural and horrid if the size of the objects had not been pretty nearly proportioned to their distance from the eye. We learn from Vitruvius, that Agatharchus, instructed by Æschylus, was the first who wrote upon this subject; and that afterwards the principles of this art were more distinctly taught by Democritus and Anaxagoras, the disciples of Agatharchus. Of the theory of this art, as described by them, we know nothing; since none of their writings have escaped the general wreck that was made of ancient literature in the dark ages of Europe. However, the revival of painting in Italy was accompanied with a revival of this art.

The first person who attempted to lay down the rules of perspective was Pietro del Borgo, an Italian. He supposed objects to be placed beyond a transparent tablet, and endeavoured to trace the images which rays of light, emitted from them, would make upon it. But we do not know what success he had in this attempt, because the book which he wrote upon this subject is not now extant. It is, however, very much commended by the famous Egnazio Dante; and, upon the principles of Borgo, Albert Durer constructed a machine, by which he could trace the perspective appearance of objects.

Barthazar Peruzzi studied the writings of Borgo, and endeavoured to make them more intelligible. To him we owe the discovery of points of distance, to which all lines that make an angle of 45 degrees with the ground-line are drawn. A little time after, Guido

Ulbaldi, another Italian, found that all the lines that are parallel to one another, if they be inclined to the ground-line, converge to some point in the horizontal line; and that through this point also, a line drawn from the eye, parallel to them, will pass. These principles put together enabled him to make out a pretty complete theory of perspective.

Great improvements were made in the rules of perspective by subsequent geometers; particularly by professor Gravesande, and still more by Dr Brook Taylor, whose principles are in a great measure new, and far more general than any before him.

In order to understand the principles of perspective, it will be proper to consider the plane on which the representation is to be made as transparent, and interposed between the eye of the spectator and the object to be represented. Thus, suppose a person at a window looks through an upright pane of glass at any object beyond it, and, keeping his head steady, draws the figure of the object upon the glass with a black lead pencil, as if the point of the pencil touched the object itself; he would then have a true representation of the object in perspective as it appears to his eye.

In order to this two things are necessary: first, that the glass be laid over with strong gum-water, which, when dry, will be fit for drawing upon, and will retain the traces of the pencil; and, secondly, that he looks through a small hole in a thin plate of metal, fixed about a foot from the glass, between it and his eye, and that he keeps his eye close to the hole; otherwise he might shift the position of his head, and consequently make a false delineation of the object.

Having traced out the figure of the object, he may go over it again with pen and ink; and when that is dry, put a sheet of paper upon it, and trace it thereon with a pencil: then taking away the paper and laying it on a table, he may finish the picture by giving it the colours, lights, and shades, as he sees them in the

the object itself; and then he will have a true resemblance of the object.

To every person who has a general knowledge of the principles of optics, this must be self-evident: For as vision is occasioned by pencils of rays coming in straight lines to the eye from every point of the visible object, it is plain that, by joining the points in the transparent plane, through which all those pencils respectively pass, an exact representation must be formed of the object, as it appears to the eye in that particular position, and at that determined distance: and were pictures of things to be always first drawn on transparent planes, this simple operation, with the principle on which it is founded, would comprise the whole theory and practice of perspective. As this, however, is far from being the case, rules must be deduced from the sciences of optics and geometry for drawing representations of visible objects on opaque planes; and the application of these rules constitutes what is properly called the *art of perspective*.

Previous to our laying down the fundamental principles of this art, it may not be improper to observe, that when a person stands right against the middle of one end of a long avenue or walk, which is straight and equally broad throughout, the sides thereof seem to approach nearer and nearer to each other as they are further and further from his eye; or the angles, under which their different parts are seen, become less and less according as the distance from his eye increases; and if the avenue be very long, the sides of it at the farthest end will seem to meet: and there an object that would cover the whole breadth of the avenue, and be of a height equal to that breadth, would appear only to be a mere point. See OPTICS, n° 219, 220.

Having made these preliminary observations, we now proceed to the practice of perspective, which is built upon the following

(Fundamental) THEOREM I.

Let $abcd$ (fig. 1. Plate CCCLXXXIII.) represent the ground-plan of the figure to be thrown into perspective, and $efgb$ the transparent plane through which it is viewed by the eye at E . Let these planes intersect in the straight line kl . Let B be any point in the ground plan, and BE a straight line, the path of a ray of light from that point to the eye. This will pass through the plane $efgb$ in some point b ; or B will be seen through that point, and b will be the picture, image, or representation of B .

If BA be drawn in the ground plan, making any angle BAK with the common intersection, and EV be drawn parallel to it, meeting the picture-plane or perspective-plane in V , and VA be drawn, the point b is in the line VA so situated that BA is to EV as bA to bV .

For since EV and BA are parallel, the figure $BAVEbB$ is in one plane, cutting the perspective-plane in the straight line VA ; the triangles BAb , EVb , are similar, and $BA : EV :: bA : bV$.

Cor. 1. If B be beyond the picture, its picture b is above the intersection kl ; but if B be between the eye and the picture, as at B' , its picture b' is below kl .

2. If two other parallel lines BA' , ES , be drawn,

and A' , S , be joined, the picture of B is in the intersection of the lines AV and $A'S$.

3. The line BA is represented by bA , or bA is the picture of BA ; and if AB be infinitely extended, it will be represented by AV . V is therefore called the *vanishing point* of the line AB .

4. All lines parallel to AB are represented by lines converging to V from the points where these lines intersect the perspective plane; and therefore V is the vanishing point of all such parallel lines.

5. The pictures of all lines parallel to the perspective plane are parallel to the lines themselves.

6. If through V be drawn HVD parallel to kl , the angle EVH is equal to BAK .

Remark. The proposition now demonstrated is not limited to any inclination of the picture-plane to the ground plane; but it is usual to consider them as perpendicular to each other, and the ground-plane as horizontal. Hence the line kl is called the *ground line*, and OH the *horizon-line*; and VK , perpendicular to both, is called the *height of the eye*.

If ES be drawn perpendicular to the picture-plane, it will cut it in a point S of the horizon-line directly opposite to the eye. This is called the *point of sight*, or *principal point*.

7. The pictures of all vertical lines are vertical, and the pictures of horizontal lines are horizontal, because these lines are parallel to the perspective plane.

8. The point of sight S is the vanishing point of all lines perpendicular to the perspective plane.

The above proposition is a sufficient foundation for the whole practice of perspective, whether on direct or inclined pictures, and serves to suggest all the various practical constructions, each of which has advantages which suit particular purposes. Writers on the subject have either confined themselves to one construction, from an affectation of simplicity or fondness for system; or have multiplied precepts, by giving every construction for every example, in order to make a great book, and give the subject an appearance of importance and difficulty. An ingenious practitioner will avoid both extremes, and avail himself of the advantage of each construction as it happens to suit his purpose. We shall now proceed to the practical rules, which require no consideration of intersecting planes, and are all performed on the perspective plane by means of certain substitutions for the place of the eye and the original figure. The general substitution is as follows:

Let the plane of the paper be first supposed to be the ground-plan, and the spectator to stand at F (fig. 2.) Let it be proposed that the ground-plan is to be represented on a plane surface, standing perpendicularly on the line GKI of the plan, and that the point K is immediately opposite to the spectator, or that FK is perpendicular to GL : then FK is equal to the distance of the spectator's eye from the picture.

Now suppose a piece of paper laid on the plan with its straight edge lying on the line GL ; draw on this paper KS perpendicular to GL , and make it equal to the height of the eye above the ground-plan. This may be much greater than the height of a man, because the spectator may be standing on a place much raised above the ground-plan. Observe also that KS must

must be measured on the same scale on which the ground plan and the distance FK were measured. Then draw HSO parallel to GL. This will be a horizontal line, and (when the picture is set upright on GL) will be on a level with the spectator's eye, and the point S will be directly opposite to his eye. It is therefore called the *principal point*, or *point of sight*. The distance of his eye from this point will be equal to FK. Therefore make SP (in the line SK) equal to FK, and P is the projecting point or substitute for the place of the eye. It is sometimes convenient to place P above S, sometimes to one side of it on the horizontal line, and in various other situations; and writers, ignorant of, or inattentive to, the principles of the theory, have given it different denominations, such as *point of distance*, *point of view*, &c. It is merely a substitute for the point E in fig. 1. and its most natural situation is below, as in this figure.

The art of perspective is conveniently divided into **ICHOGRAPHY**, which teaches how to make a perspective draught of figures on a plane, commonly called the ground-plan; and **SCENOGRAPHY**, which teaches how to draw solid figures, or such figures as are raised above this plan.

Fundamental PROB. I. *To put into perspective any given point of the ground plan.*

First general construction.

Plate CLXXXIII. From B and P (fig. 2.) draw any two parallel lines BA, PV, cutting the ground-line and horizon-line in A and V, and draw BP, AV, cutting each other in *b*; *b* is the picture of B.

For it is evident that BA, PV, of this figure are analogous to BA and EV of fig. 1. and that $BA : PV = bA : bV$.

If BA be drawn perpendicular to GL, PV will fall on PS, and need not be drawn. AV will be A'S. —This is the most easy construction, and is nearly the same with Fergusson's.

Second general construction.

Draw two lines BA, BA", and two lines PV, PD, parallel to them, and draw AV, A"D, cutting each other in *b*; *b* is the picture of B by Cor. 2 —This construction is the foundation of all the rules of perspective that are to be found in the books on this subject. They appear in a variety of forms, owing to the ignorance or inattention of the authors to the principles. The rule most generally adhered to is as follows:

Draw BA (fig. 3.) perpendicular to the ground-line, and AS to the point of sight, and set off AS equal to BA. Set off SD equal to the distance of the eye in the opposite direction from S that *b* is from A, where B and E of fig. 1. are on opposite sides of the picture; otherwise set them the same way. D is called the point of distance. Draw BD, cutting AS in B. This is evidently equivalent to drawing BA and PS perpendicular to the ground-line and horizon line, and B^o and PD making an angle of 45° with these lines, with the additional puzzle about the way of setting off AS and SD, which is avoided in the construction here given.

This usual construction, however, by a perpendicular and the point of distance, is extremely simple and convenient; and two points of distance, one on each side of S, serve for all points of the ground plan. But the first general construction requires still fewer lines,

if BA be drawn perpendicular to GL, because PV will then coincide with PS.

Third general construction.

Draw BA from the given point B perpendicular to the ground line, and AS to the point of sight. From the point of distance D set off Dd equal to BA, on the same or the contrary side as S, according as B is on the same or the contrary side of the picture as the eye. Join d, A, and draw Dd parallel to dA. *b* is the picture of B. For SD, Dd, are equal to the distances of the eye and given point from the picture, and $SD : Dd = bS : bA$.

This construction does not naturally arise from the original lines, but is a geometrical consequence from their position and magnitude; and it is of all others the most generally convenient, as the perpendicular distances of any number of points may be arranged along SD without confusion, and their direct situations transferred to the ground-line by perpendiculars such as BA; and nothing is easier than drawing parallels, either by a parallel ruler or a bevel-square, used by all who practise drawing.

PROB. 2. *To put any straight line BC (fig. 4.) of the ground plan in perspective.*

Find the pictures *b*, *c*, of its extreme points by any of the foregoing constructions, and join them by the straight line *bc*.

Perhaps the following construction will be found very generally convenient.

Produce CB till it meet the ground-line in A, and draw PV parallel to it, and AV, and PB. PC, cutting AV in *b*, *c*. V is its vanishing point, by Cor. 3. of the fundamental theorem.

It must be left to the experience and sagacity of the drawer to select such constructions as are most suitable to the multiplicity of the figures to be drawn.

PROB. 3. *To put any rectilinear figure of the ground-plan in perspective.*

Put the bounding lines in perspective, and the problem is solved.

The variety of constructions of this problem is very great, and it would fill a volume to give them all. The most generally convenient is to find the vanishing points of the bounding lines, and connect these with the points of their intersection with the ground-line. For example, to put the square ABCD (fig. 5.) into perspective.

Draw from the projecting point PV, PW, parallel to AB, BC, and let AB, BC, CD, DA, meet the ground-line in *a*, *x*, *b*, *y*, and draw aV, xV, bV, yV, cutting each other in *abcd*, the picture of the square ABCD. The demonstration is evident.

This construction, however, runs the figure to great distances on each side of the middle line when any of the lines of the original figure are nearly parallel to the ground-line.

The following construction (fig. 6.) avoids this inconvenience.

Let D be the point of distance. Draw the perpendiculars Aa, Bb, Cc, Dd, and the lines Aa, Bb, Cc, Dd, parallel to PD. Draw Sa, S', S'', S''', and Dc, Dj, Dg, Dh, cutting the former in *a*, *b*, *c*, *d*, the angles of the picture.

It is not necessary that D be the point of distance, only the lines Aa, Bb, &c. must be parallel to PD.

Remark.

Remark. In all the foregoing constructions the necessary lines (and even the finished picture) are frequently confounded with the original figure. To avoid this great inconvenience, the writers on perspective direct us to transpose the figure; that is, to transfer it to the other side of the ground line, by producing the perpendiculars Ax , B , C , D , till Ax , B , &c. are respectively equal to Ax , B , &c.; or, instead of the original figure, to use only its transposed substitute $A'BCD$. This is an extremely proper method. But in this case the point P must also be transposed to P' above S , in order to retain the first or most natural and simple construction, as in fig. 7; where it is evident, that when $BA=AB'$, and $SP=SP'$, and $B'P'$ is drawn, cutting AS in b , we have $bA : bS = BA : PS = BA' : P'S$, and b is the picture of B : whence follows the truth of all the subsequent constructions with the transposed figure.

PROB. 4. *To put any curvilinear figure to the ground-plan into perspective.*

Put a sufficient number of its points in perspective by the foregoing rules, and draw a curve line through them.

It is well known that the conic sections and some other curves, when viewed obliquely, are conic sections or curves of the same kinds with the originals, with different positions and proportions of their principal lines, and rules may be given for describing their pictures founded on this property. But these rules are very various, unconnected with the general theory of perspective, and more tedious in the execution, without being more accurate than the general rule now given. It would be a useless affectation to insert them in this elementary treatise.

We come in the next place to the delineation of figures not in a horizontal plane, and of solid figures. For this purpose it is necessary to demonstrate the following

THEOREM II.

The length of any vertical line standing on the ground plane is to that of its picture as the height of the eye to the distance of the horizon line from the picture of its foot.

Let BC be the vertical line standing on B , and let EF be a vertical line through the eye. Make BD equal to EF , and draw DE , CE , BE . It is evident that DE will cut the horizon line in some point d , CE will cut the picture plane in c , and BE will cut it in b , and that bc will be the picture of BC , and is vertical, and that BC is to bc as BD to bd , or as EF to bd .

Cor. The picture of a vertical line is divided in the same ratio as the line itself. For $BC : BM = bc : bm$.

PROB. 5. *To put a vertical line of a given length in perspective standing on a given point of the picture.*

Through the given point b (Fig. 8.) of the picture, draw SbA from the point of sight, and draw the vertical line AD , and make AE equal to the length or height of the given line. Join ES , and draw bc parallel to AD , producing bc , when necessary, till it cut the horizontal line in d , and we have $bc : bd = AD : AE$, that is, as the length of the given line to

the height of the eye, and bd is the distance of the horizon-line from the point b , which is the picture of the foot of the line. Therefore (Theor. 2.) bc is the required picture of the vertical line.

This problem occurs frequently in views of architecture; and a compendious method of solving it would be peculiarly convenient. For this purpose, draw a vertical line XZ at the margin of the picture, or on a separate paper, and through any point V of the horizon-line draw VX . Set off XY , the height of the vertical line, and draw VY . Then from any points b , r , on which it is required to have the pictures of lines equal to XY , draw VS , rs , parallel to the horizon line, and draw the verticals Ss , rs : these have the lengths required, which may be transferred to b and r . This, with the third general construction for the base points, will save all the confusion of lines which would arise from constructing each line apart.

PROB. 6. *To put any sloping line in perspective.*

From the extremities of this line, suppose perpendiculars making the ground plane in two points, which we shall call the base points of the sloping line. Put these base points in perspective, and draw, by last problem, the perpendiculars from the extremities. Join these by a straight line. It will be the picture required.

PROB. 7. *To put a square in perspective, as seen by a person not standing right against the middle of either of its sides, but rather nearly even with one of its corners.*

In fig. 9. let $ABCD$ be a true square, viewed by an observer, not standing at o , directly against the middle of its side AD , but at O almost even with its corner D , and viewing the side AD under the angle AOD ; the angle AoD (under which he would have seen AD from o) being 60 degrees.

Make AD in fig. 10. equal to AD in fig. 9. and draw SP and OO parallel to AD . Then, in fig. 10. let O be the place of the observer's eye, and SO be perpendicular to SP ; then S shall be the point of sight in the horizon SP .

Take SO in your compasses, and set that extent from S to P : then P shall be the true point of distance, taken according to the foregoing rules.

From A and D draw the straight lines AS and DS ; draw also the straight line AP , intersecting DS in C .

Lastly, to the point of intersection C draw BC parallel to AD ; and $ABCD$ in fig. 10. will be a true perspective representation of the square $ABCD$ in fig. 9. The point M is the centre of each square, and AMC and BMD are the diagonals.

PROB. 8. *To put a reticulated square in perspective, as seen by a person standing opposite to the middle of one of its sides.*

A reticulated square is one that is divided into several little squares, like net-work, as fig. 11. each side of which is divided into four equal parts, and the whole surface into four times four (or 16) equal squares.

Having divided this square into the given number of lesser squares, draw the two diagonals $A \times C$ and $B \times D$.

Make AD in fig. 12. equal to AD in fig. 11. and divide it into four equal parts, as Ae , eg , gi , and iD .

Draw Sx' for the horizon, parallel to AD , and, through

through the middle point *g* of AD, draw OS perpendicular to AD and SP—Make *S* the point of sight, and *O* the place of the observer's eye.

Take SP equal to SO, and *P* shall be the true point of distance.—Draw AS and DS to the point of sight, and AP to the point of distance, intersecting DS in *C*: then draw BC parallel to AD, and the outlines of the reticulated square ABCD will be finished.

From the division-points *e, g, i*, draw the straight lines *e f, g b, i k*, tending towards the point of sight *S*; and draw BD for one of the diagonals of the square, the other diagonal AC being already drawn.

Through the points *r* and *s*, where these diagonals cut *e f* and *i k*, draw *lm* parallel to AD. Through the centre point *x*, where the diagonals cut *g b*, draw *no* parallel to AD—Lastly, through the points *v* and *w*, where the diagonals cut *e f* and *i k*, draw *p q* parallel to AD; and the reticulated perspective square will be finished.

This square is truly represented, as if seen by an observer standing at *O*, and having his eye above the horizontal plane ABCD on which it is drawn; as if OS was the height of his eye above that plane; and the lines which form the small squares within it have the same letters of reference with those in fig. 11. which is drawn as it would appear to an eye placed perpendicularly above its centre *x*.

PROB. 9. To put a circle in perspective.

If a circle be viewed by an eye placed directly over its centre, it appears perfectly round, but if it be obliquely viewed, it appears of an elliptical shape. This is plain by looking at a common wine-glass set upright on a table.

Make a true reticulated square, as fig. 11. Plate CCCLXXXII. of the same diameter as you would have the circle; and setting one foot of your compasses in the centre *x*, describe as large a circle as the sides of the square will contain. Then, having put this reticulated square into perspective, as in fig. 12. observe through what points of the cross lines and diagonals of fig. 11. the circle passes; and through the like points in fig. 12. draw the ellipsis, which will be as true a perspective representation of the circle, as the square in fig. 12. is of the square in fig. 11.

This is Mr Ferguson's rule for putting a circle in perspective; but the following rules by Wolf are perhaps more universal.

If the circle to be put in perspective be small, describe a square about it. Draw first the diagonals of the square, and then the diameters *b a* and *d e* (fig. 1. Plate CCCLXXXIV.) cutting one another at right angles; draw the straight lines *g g* and *b e* parallel to the diameter *d e*. Through *b* and *f* and likewise *e* and *g* draw straight lines meeting DE, the ground line of the picture in the points *3* and *4*. To the principal point *V* draw the straight lines *1 V, 3 V, 4 V, 2 V*, and to the points of distance *L* and *K*, *2 L* and *1 K*. Lastly, join the points of intersection *a, b, d, f, b, g, e, c*, by the arcs *a b, b d, d f, a b d f b g e c a* will be the circle in perspective.

If the circle be large so as to make the foregoing practice inconvenient, bisect the ground line AB, describing from the point of bisection as a centre, the semicircle AGB (fig. 2. Plate CCCLXXXIV.), and from any number of points in the circumference *C, F, G, H, I*, &c. draw to the ground line the perpendi-

culars *C 1, F 2, G 3, H 4, I 5*, &c.: From the points *A, 1, 2, 3, 4, 5, B*, draw straight lines to the principal point or point of sight *V*, likewise straight lines from *B* and *A* to the points of distance *L* and *K*. Through the common intersections draw straight lines as in the preceding case; and you will have the points *a, c, f, g, b, i, b*, representatives of *A, C, F, G, H, I, B*. Then join the points *a, c, f*, &c. as formerly directed, and you have the perspective circle *a c f, b i b g f c a*.

Hence it is apparent how we may put not only a circle but also a pavement laid with stones of any form in perspective. It is likewise apparent how useful the square is in perspective; for, as in the second case, a true square was described round the circle to be put in perspective, and divided into several smaller squares, so in this third case we make use of the semicircle only for the sake of brevity instead of that square and circle.

PROB. 10. To put a reticulated square in perspective, as seen by a person not standing right against the middle of either of its sides, but rather nearly even with one of its corners.

In fig. 13. Plate CCCLXXXIII. let *O* be the place of an observer, viewing the square ABCD almost even with its corner *D*—Draw at pleasure SP for the horizon, parallel to AD, and make SO perpendicular to SP: then *S* shall be the point of sight, and *P* the true point of distance, if SP be made equal to SO.

Draw AS and DS to the point of sight, and AP to the point of distance, intersecting DS in the point *C*; then draw BC parallel to AD, and the outlines of the perspective square will be finished. This done, draw the lines which form the lesser squares, as taught in Prob. 8. and the work will be completed.—You may put a perspective circle in this square by the same rule as it was done in fig. 12.

PROB. 14. To put a cube in perspective, as if viewed by a person standing almost even with one of its sides, and seeing three of its sides.

In fig. 16. Plate CCCLXXXIII. let AB be the breadth of either of the six equal square sides of the cube AG; *O* the place of the observer, almost even with the edge CD of the cube, *S* the point of sight, SP the horizon parallel to AD, and *P* the point of distance taken as before.

Make ABCD a true square; draw BS and CS to the point of sight, and BP to the point of distance, intersecting CS in *G*.—Then draw FG parallel to BC, and the uppermost perspective square side BFGC of the cube will be finished.

Draw DS to the point of sight, and AP to the point of distance, intersecting DS in the point *I*: then draw CI parallel to CD; and, if the cube be an opaque one, as of wood or metal, all the outlines of it will be finished; and then it may be shaded as in the figure.

But if you want a perspective view of a transparent glass cube, all the sides of which will be seen, draw AH toward the point of sight, FH parallel to BA, and HI parallel to AD: then AHID will be the square base of the cube, perspective parallel to the top BFGC; ABFH will be the square side of the cube, parallel to CGID, and FGIH will be the square side parallel to ABCD.

As to the shading part of the work, it is such mere childrens play, in comparison of drawing the lines

which form the shape of any object, that no rules need be given for it. Let a person sit with his left side toward a window, and he knows full well, that if any solid body be placed on a table before him, the light will fall on the left-hand side of the body, and the right-hand side will be in the shade.

PROB. 15. *To put any solid in perspective.*

Put the base of the solid, whatever it be, in perspective by the preceding rules. From each bounding point of the base, raise lines representing in perspective the altitude of the object; by joining these lines and shading the figure according to the directions in the preceding problem, you will have a scenographic representation of the object. This rule is general; but as its application to particular cases may not be apparent, it will be proper to give the following example of it.

PROB. 16. *To put a cube in perspective as seen from one of its angles.*

Since the base of a cube standing on a geometrical plane, and seen from one of its angles, is a square seen from one of its angles, draw first such a perspective square: then raise from any point of the ground-line DE (Fig. 3. Plate CCCLXXXIV.) the perpendicular HI equal to the side of the square, and draw to any point V in the horizontal line HR the straight lines VI and VH. From the angles db and c draw the dotted lines $d2$ and $c1$ parallel to the ground line DE. Perpendicular to these dotted lines, and from the points 1 and 2, draw the straight lines L1 and M2. Lastly, since HI is the altitude of the intended cube in a , L1 in c and b , M2 in d , draw from the point a the straight line fa perpendicular to aE , and from the points b and c , bg and ce , perpendicular to $bc1$, and $abdc$ being according to rule, make $af=HI$, $bg=ec=L1$, and $bd=M2$. Then, if the points g, h, e, f , be joined, the whole cube will be in perspective.

PROB. 17. *To put a square pyramid in perspective, as standing upright on its base, and viewed obliquely.*

In fig. 4. n° 1. of Plate CCCLXXXIV. let AD be the breadth of either of the four sides of the pyramid ATCD at its base ABCD; and MT its perpendicular height. Let O be the place of the observer, S his point of sight, SE his horizon, parallel to AD and perpendicular to OS; and let the proper point of distance be taken in SE produced toward the left hand, as far from S as O is from S.

Draw AS and DS to the point of sight, and DL to the point of distance, intersecting AS in the point B. Then, from B, draw BC parallel to AD; and ABCD shall be the perspective square base of the pyramid.

Draw the diagonal AC, intersecting the other diagonal BD at M, and this point of intersection shall be the centre of the square base.

Draw MT perpendicular to AD, and of a length equal to the intended height of the pyramid: then draw the straight outlines AT, CT, and DT; and the outlines of the pyramid (as viewed from O) will be finished; which being done, the whole may be so shaded as to give it the appearance of a solid body.

If the observer had stood at o , he could have only seen the side ATD of the pyramid; and two is the greatest number of sides that he could see from any other place of the ground. But if he were at any height above the pyramid, and had his eye directly

over its top, it would then appear as in N° 2. and he would see all its four sides E, F, G, H, with its top t just over the centre of its square base ABCD; which would be a true geometrical and not a perspective square.

PROB. 18. *To put two equal squares in perspective, one of which shall be directly over the other, at any given distance from it, and both of them parallel to the plane of the horizon.*

In fig. 5. Plate CCCLXXXIV. let ABCD be a perspective square on a horizontal plane, drawn according to the foregoing rules. S being the point of sight, SP the horizon (parallel to AD), and P the point of distance.

Suppose AD, the breadth of this square, to be three feet; and that it is required to place just such another square EFGH directly above it, parallel to it and two feet from it.

Make AE and DH perpendicular to AD, and two thirds of its length: draw EH, which will be equal and parallel to AD; then draw ES and HS to the point of sight S, and EP to the point of distance P, intersecting HS in the point G: this done, draw FG parallel to EH; and you will have two perspective squares ABCD and EFGH, equal and parallel to one another, the latter directly above the former, and two feet distant from it; as was required.

By this method shelves may be drawn parallel to one another, at any distance from each other in proportion to their length.

PROB. 19. *To put a truncated pyramid in perspective.*

Let the pyramid to be put in perspective be quin-quangular. If from each angle of the surface whence the top is cut off, a perpendicular be supposed to fall upon the base, these perpendiculars will mark the bounding points of a pentagon, of which the sides will be parallel to the sides of the base of the pyramid within which it is inscribed. Join these points, and the interior pentagon will be formed with its longest side parallel to the longest side of the base of the pyramid. From the ground-line EH (Fig. 6. Plate CCCLXXXIV.) raise the perpendicular IH, and make it equal to the altitude of the intended pyramid. To any point V draw the straight lines IV and HV, and by a process similar to that in Problem 16. determine the scenographical altitudes a, b, c, d, e . Connect the upper points f, g, h, i, k , by straight lines; and draw lk, fm, gn , and the perspective of the truncated pyramid will be completed.

Cor. If in a geometrical plane two concentric circles be described, a truncated cone may be put in perspective in the same manner as a truncated pyramid.

PROB. 20. *To put in perspective a hollow prism lying on one of its sides.*

Let ABDEC (fig. 7. n° 1.) be a section of such a prism. Draw HI parallel to AB, and distant from it the breadth of the side on which the prism rests; and from each angle internal and external of the prism let fall perpendiculars to HI. The parallelogram will be thus divided by the ichnographical process below the ground-line, so as that the side AB of the real prism will be parallel to the corresponding side of the scenographic view of it.—To determine the altitude of the internal and external angles. From H (n° 2.) raise HI perpendicular to the ground-line, and on it mark

mark off the true altitudes H_1, H_2, H_3, H_4 , and H_5 . Then if from any point V in the horizon be drawn the straight lines $VH_1, V_1, V_2, V_3, V_4, V_5$ or VI ; by a process similar to that of the preceding problem, will be determined the height of the internal angles, viz. $1=aa, 2=bb, 4=dd$; and of the external angles, $3=cc$, and $5=ee$; and when these angles are formed and put in their proper places, the scenograph of the prism is complete.

PROB. 21. *To put a square table in perspective, standing on four upright square legs of any given length with respect to the breadth of the table.*

In fig. 5. Plate CCCLXXXIV. let $ABCD$ be the square part of the floor on which the table is to stand, and $EFGH$ the surface of the square table, parallel to the floor.

Suppose the table to be three feet in breadth, and its height from the floor to be two feet; then two thirds of AD or EH will be the length of the legs i and k ; the other two (l and m) being of the same length in perspective.

Having drawn the two equal and parallel squares $ABCD$ and $EFGH$, as shown in Prob. 10. let the legs be square in form, and fixed into the table at a distance from its edges equal to their thickness. Take Aa and Dd equal to the intended thickness of the legs, and ab and dc also equal thereto. Draw the diagonals AC and BD , and draw straight lines from the points a, b, c, d , towards the points of sight S , and terminating at the side BC . Then, through the points where these lines cut the diagonals, draw the straight lines n and o, p and q , parallel to AD ; and you will have formed four perspective squares (like $ABCD$ in fig. 4. n° 1.) for the bases of the four legs of the table; and then it is easy to draw the four upright legs by parallel lines, all perpendicular to AD ; and to shade them as in the figure.

To represent the intended thickness of the table-board, draw eb parallel to EH , and HG toward the point of sight S : then shade the spaces between these lines, and the perspective figure of the table will be finished.

PROB. 22. *To put five square pyramids in perspective, standing upright on a square pavement composed of the surfaces of 81 cubes.*

In fig. 8. Plate CCCLXXXIV. let $ABCD$ be a perspective square drawn according to the foregoing rules; S the point of sight, P the point of distance in the horizon PS , and AC and BD the two diagonals of the square.

Divide the side AD into 9 equal parts (because 9 times 9 is 81) as Aa, ab, bc , &c. and from these points of division, a, b, c, d , &c. draw lines toward the point of sight S , terminating at the furthestmost side BC of the square. Then, through the points where these lines cut the diagonals, draw straight lines parallel to AD , and the perspective square $ABCD$ will be subdivided into 81 lesser squares, representing the upper surfaces of 81 cubes, laid close to one another's sides in a square form.

Draw AK and DL , each equal to Aa , and perpendicular to AD ; and draw LN toward the point of sight S : then draw KL parallel to AD , and its distance from AD will be equal to Aa .—This done, draw $al, bm, cn, do, ef, fg, gr$, and hs , all paral-

lel to AK , and the space $ADLK$ will be subdivided into nine equal squares, which are the outer upright surfaces of the nine cubes in the side AD of the square $ABCD$.

Draw LN toward the point of sight S ; and from the points where the lines, which are parallel to AD in this square, meet the side CD thereof, draw short lines to LN , all parallel to DL , and they will divide that side into the outer upright surfaces of the nine cubes which compose it: and then the outsides of all the cubes that can be visible to an observer, placed at a proper distance from the corner D of the square, will be finished.

As taught in Prob. 17. place the pyramid AE upright on its square base $Aeva$, making it as high as you please; and the pyramid DH on its square base $huwD$, of equal height with AE .

Draw EH from the top of one of these pyramids to the top of the other; and EH will be parallel to AD .

Draw ES and HS to the point of sight S , and HP to the point of distance P , intersecting ES in F .

From the point F , draw FG parallel to EH ; then draw EG , and you will have a perspective square $EFGH$ (parallel to $ABCD$) with its two diagonals EG and FH , intersecting one another in the centre of the square at I . The four corners of this square, E, F, G, H , give the perspective heights of the four pyramids AE, BF, CG , and DH ; and the intersection I of the diagonals gives the height of the pyramid MI , the centre of whose base is the centre of the perspective square $ABCD$.

Lastly, place the three pyramids BF, CG, MI , upright on their respective bases at B, C , and M ; and the required perspective representation will be finished, as in the figure.

PROB. 23. *To put upright pyramids in perspective, on the sides of an oblong square or parallelogram; so that their distances from one another shall be equal to the breadth of the parallelogram.*

In most of the foregoing operations we have considered the observer to be so placed, as to have an oblique view of the perspective objects: in this, we shall suppose him to have a direct view of fig. 8. Plate CCCLXXXIV. that is, standing right against the middle of the end AD which is nearest to his eye, and viewing AD under an angle of 60 degrees.

Having cut AD in the middle, by the perpendicular line Ss , take S therein at pleasure for the point of sight, and draw ES for the horizon, parallel to AD .—Here Ss must be supposed to be produced downward, below the limits of the plate, to the place of the observer; and SE to be produced towards the left hand beyond E , far enough to take a proper point of distance therein, according to the foregoing rules.

Take Ad at pleasure, and Dg equal to Ad , for the breadths of the square bases of the two pyramids AE and DF next the eye: then draw AS and dS , and likewise DS and gS , to the point of sight S ; and DG on to the point of distance, intersecting AS in G : then, from G draw GI parallel to AD , and you will have the first perspective square $AGID$ of the parallelogram $ABCD$.

From I draw Ih to (or toward) the point of distance, intersecting AS in H ; then, from H draw

HK parallel to AD, and you will have the second perspective square GMKI of the parallelogram.—Go on in this manner till you have drawn as many perspective squares up to yard S as you please.

Through the point *g*, where DG intersects *gS*, draw *hg* parallel to AD; and you will have formed the two perspective square bases *A b c d* and *g f D g* of the two pyramids at A and D.

From the point *f* (the upper outward corner of *cf Dg*) draw *fh* toward the point of distance, till it meets AS in *h*; then, from this point of meeting, draw *hm* parallel to GI, and you will have formed the two perspective square bases *G h i k* and *l m l n*, for the square bases of the two pyramids at G and I.

Proceed in the same manner to find the bases of all the other pyramids, at the corners of the rest of the perspective squares in the parallelogram ABCD, as shown by the figure.—Then,

Having placed the first two pyramids at A and D upright on their square bases, as shown in Prob 9, and made them of any equal heights at pleasure, draw ES and FS from the tops of these pyramids to the point of sight S: place all the rest of the pyramids upright on their respective bases, making their tops touch the straight lines ES and FS; and all the work, except the finishing part, will be finished.

PROB. 24. *To put a square pyramid of equal sized cubes in perspective.*

Fig. 2. Plate CCCLXXXV. represents a pyramid of this kind; consisting as it were of square tables of cubes, one table above another; 81 in the lowest, 49 in the next, 25 in the third, 9 in the fourth, and 1 in the fifth or uppermost. These are the square numbers of 9, 7, 5, 3, and 1.

If the artist is already master of all the preceding operations, he will find less difficulty in this than in attending to the following description of it: for it cannot be described in a few words, but may be executed in a very short time.

In fig. 1. having drawn PS for the horizon, and taken S for the point of sight therein (the observer being at O) draw AD parallel to PS for the side (next the eye) of the first or lowermost table of cubes. Draw AS and DS to the point of sight S, and DP to the point of distance P, intersecting AS in the point B. Then, from B, draw BC parallel to AD, and you will have the surface ABCD of the first table.

Divide AD into nine equal parts, as A *a*, *a b*, *b c*, *c d*, &c. then make AK and DL equal to A *a*, and perpendicular to AD. Draw KL parallel to AD, and from the points of equal division at *a*, *b*, *c*, &c. draw lines to KL, all parallel to AK. Then draw *b S* to the point of sight S, and from the division-points *a*, *b*, *c*, &c. draw lines with a black lead pencil, all tending towards the point of sight, till they meet the diagonal BD of the square.

From these points of meeting draw black lead lines to DC, all parallel to AD; then draw the parts of these lines with black ink which are marked 1, 2, 3, 4, &c. between *b E* and DC.

Having drawn the first of these lines *b g* with black ink, draw the parts *a i*, *b k*, *c l*, &c. (of the former lines which met the diagonal BD) with black ink also; and rub out the rest of the black lead lines, which would otherwise confuse the following part of the

work. Then, draw LF toward the point of sight S; and, from the points where the lines 1, 2, 3, 4, &c. meet the line DC, draw lines down to LF, all parallel to DL; and all the visible lines between the cubes in the first table will be finished.

Make *i G* equal and perpendicular to *h i*, and *g M* equal and parallel to *i G*: then draw GM, which will be equal and parallel to *i g*. From the points *h l*, *m o*, &c. draw *h n*, *i o*, *m p*, &c. all parallel to *i G*, and the outlines of the seven cubes in the side G *g* of the second table will be finished.

Draw GS and MS to the point of sight S, and MP to the point of distance P, intersecting GS in *n*; then, from the point of intersection *n*, draw *ni* parallel to AD; and you will have the surface G *h i M* of the second table of cubes.

From the points *n*, *o*, *p*, *q*, &c. draw black lead lines toward the point of sight S, till they meet the diagonal MH of the perspective square surface G *h i M*; and draw *s M*, with black ink, toward the point of sight.

From those points where the lines drawn from *n*, *o*, *p*, *q*, &c. meet the diagonal MH, draw black lead lines to *M i*, all parallel to AD; only draw the whole first line *s i* with black ink, and the parts 2, 3, 4, &c. and *n t*, *o u*, *p v*, &c. of the other lines between *s N* and *M i*, and *G M* and *s i*, with the same; and rub out all the rest of the black lead lines; to avoid further confusion. Then, from the points where the short lines 1, 2, 3, &c. meet the line *M i*, draw lines down to *g E*, all parallel to *M g*, and the outer surfaces of the seven cubes in the side ME will be finished; and all these last lines will meet the former parallels 2, 3, 4, &c. in the line *g E*.

Make *t O* equal and perpendicular to *s t*, and *y P* equal and parallel to *t O*; then draw OP, which will be equal and parallel to *t y*.—This done, draw OS and PS to the point of sight S, and PP to the point of distance P in the horizon. Lastly, from the point Q, where PP intersects OS, draw QR parallel to OP; and you will have the outlines OQRP of the surface of the third perspective table of cubes.

From the points *u*, *v*, *w*, *x* draw upright lines to OP, all parallel to *t O*, and you will have the outer surfaces of the five cubes in the side O *y* of this third table.

From the points where these upright lines meet OP, draw lines toward the point of sight S, till they meet the diagonal PQ; and from these points of meeting draw lines to PR, all parallel to OP, making the parts 2, 3, 4, 5, of these lines with black ink which lie between ZY and PR. Then, from the points where these lines meet PR, draw lines down to *y N*; which will bound the outer surfaces of the five cubes in the side PN of the third table.

Draw the line *s i* with black ink; and, at a fourth part of its length between *s* and Z, draw an upright line to S, equal in length to that fourth part, and another equal and parallel thereto from Z to V: then draw SV parallel to *s Z*, and draw the two upright and equidistant lines between *s Z* and SV, and you will have the outer surfaces of the three cubes in the side SZ of the fourth table.

Draw SS and VS to the point of sight S in the horizon, and VP to the point of distance therein, intersecting

termining SS in T; then draw TU parallel to SV, and you have STUV, the surface of the fourth table; which being reticulated or divided into 9 perspective small squares, and the uppermost cube W placed on the middlemost of the squares, all the outlines will be finished; and when the whole is properly shaded, as in fig. 2. the work will be done.

PLATE 25. *To represent a double cross in perspective.*

In fig. 2. Plate CCCLXXXV. let ABCD and EFGH be two perspective squares, equal and parallel to one another, the uppermost directly above the lowermost, drawn by the rules already laid down, and as far asunder as is equal to the given height of the upright part of the cross; S being the point of sight, and P the point of distance, in the horizon PS taken parallel to AD.

Draw AE, DH, and CG; then AEHD and DHGC shall be the two visible sides of the upright part of the cross; of which, the length AE is here made equal to three times the breadth EH.

Divide DH into three equal parts, HI, IK, and KD. Through these points of division, at I and K, draw MO and PR parallel to AD; and make the parts MN, IO, PQ, KR, each equal to HI: then draw MP and OR parallel to DH.

From M and O, draw MS and OS to the point of sight S; and from the point of distance P draw PN cutting MS in T; from T draw TU parallel to MO, and meeting OS in U; and you will have the uppermost surface MUO of one of the cross pieces of the figure.—From R, draw RS to the point of sight S; and from U draw UV parallel to OR; and OUVR shall be the perspective square end next the eye of that cross-part.

Draw PMx (as long as you please) from the point of distance P, through the corner M; lay a ruler to N and S, and draw XN from the line PMx—then lay the ruler to I and S, and draw YZS.—Draw XY parallel to MO, and make XW and YB equal and perpendicular to XY: then draw WB parallel to XY, and WXYB shall be the square visible end of the other cross-part of the figure.

Draw BK toward the point of sight S; and from U draw UP to the point of distance P, intersecting YS in Z; then, from the intersection Z, draw Z a parallel to MO, and Z b parallel to HD, and the whole delineation will be finished.

This done, shade the whole, as in fig. 4. and you will have a true perspective representation of a double cross.

PROB 26. *To put three rows of upright square objects in perspective, equal in size, and at equal distances from each other, on an oblong square plane, the breadth of which shall be of any assigned proportion to the length thereof.*

Fig. 5. Plate CCCLXXXV. is a perspective representation of an oblong square plane, three times as long as it is broad, having a row of nine upright square objects on each side, and one of the same number in the middle; all equally high, and at equal distances from one another, both long-wise and cross-wise, on the same plane.

In fig. 6. PS is the horizon, S the point of sight, P the point of distance, and AD (parallel to PS) the breadth of the plane.

Draw AS, NS, and DS, to the point of sight S; the point N being in the middle of the line AD:

and draw DP to the point of distance P, intersecting AS in the point B: then, from B draw BC parallel to AD, and you have the perspective square ABCD.

Through the point i, where DB intersects NS, draw *ae* parallel to AD; and you will have subdivided the perspective square ABCD into four lesser squares, as *A a i N*, *N i e D*, *a B i i*, and *i e C e*.

From the point C (at the top of the perspective square ABCD) draw CP to the point of distance P, intersecting AS in E; then, from the point E draw EF parallel to AD; and you will have the second perspective square BEFC.

Through the point l, where CE intersects NS, draw *bf* parallel to AD; and you will have subdivided the square BEFC into the four squares *B b l k*, *k l j C*, *b E m l*, and *l m F j*.

From the point F (at the top of the perspective square BEFC) draw FP to the point of distance P, intersecting AS in I; then from the point I draw IK parallel to AD; and you will have the third perspective square EIKF.

Through the point n, where FI intersects NS, draw *cg* parallel to AD; and you will have subdivided the square EIKF into four lesser squares, *E c n n*, *m n g F*, *c I o n*, and *n o K g*.

From the point K (at the top of the third perspective square EIKF) draw KP to the point of distance P, intersecting AS in L; then from the point L draw LM parallel to AD; and you will have the fourth perspective square LLMK.

Through the point p, where KL intersects NS, draw *db* parallel to AD; and you will have subdivided the square LLMK into the four lesser squares *L d p o*, *o p b K*, *d L q p*, and *p q M b*.

Thus we have formed an oblong square ALMD, whose perspective length is equal to four times its breadth, and it contains 16 equal perspective squares.—If greater length was still wanted, we might proceed further on toward S.

Take A 3, equal to the intended breadth of the side of the upright square object AQ (all the other sides being of the same breadth), and AO for the intended height. Draw O 18 parallel to AD, and make D 8 and 4 7 equal to A 3; then draw 3 S, 4 S, 7 S, and 8 S to the point of sight S; and among them we shall have the perspective square bases of all the 27 upright objects on the plane.

Through the point q, where DE intersects 8 S, draw r 18 parallel to AD, and you have the three perspective square bases A 1 2 3, 4 5 6 7, 8 9 10 D, of the three upright square objects at A, N, and D.

Through the point 21, where *eb* intersects 8 S, draw 14, 11 parallel to AD; and you will have the three perspective squares *a 14 15 16 17 18 19 20*, and *21 11 e 22*, for the bases of the second cross row of objects; namely, the next beyond the first three at A, N, and D.

Through the point *ze*, where CE intersects 8 S, draw a line parallel to BC; and you will have three perspective squares, at B, k, and C, for the bases of the third row of objects; one of which is set up at B.

Through the point x, where *fe* intersects 8 S, draw a line parallel to *bf*; and you will have three perspective squares, at b, z, and x, for the bases of the fourth cross row of objects.

Go on in this manner, as you see in the figure, to

find the rest of the square bases, up to LM; and you will have 27 upon the whole oblong square plane, on which you are to place the like number of objects, as in fig. 5.

Plate
CCCLXXXV.

Having assumed AO for the perspective height of the three objects at A, N, and D (fig. 6.) next the observer's eye, and drawn O 18 parallel to AD, in order to make the objects at N and D of the same height as that at O; and having drawn the upright lines 4 15, 7 W, 8 X, and D 22, for the heights N and D: draw OS and RS, 15 S and WS, XS and 22 S, all to the point of sight S: and these lines will determine the perspective equal heights of all the rest of the upright objects, as shown by the two placed at a and B.

To draw the square tops of these objects, equal and parallel to their bases, we need only give one example, which will serve for all.

Draw 3 R and 2 Q parallel to AO, and up to the line RS; then draw PQ parallel to OR, and OPQR shall be the top of the object at A, equal and parallel to its square base A 1 2 3.—In the same easy way the tops of all the other objects are formed.

When all the rest of the objects are delineated, shade them properly, and the whole perspective scheme will have the appearance of fig. 5.

PROB. 27. *To put a square box in perspective, containing a given number of lesser square boxes of a depth equal to their width.*

Let the given number of little square boxes or cells be 16, then 4 of them make the length of each side of the four outer sides *ab*, *bc*, *cd*, *da*, as in fig. 7. and the depth *af* is equal to the width *ae*. Whoever can draw the reticulated square, by the rules laid down towards the beginning of this article, will be at no loss about putting this perspective scheme in practice.

PROB. 28. *To put stairs with equal and parallel steps in perspective.*

In fig. 1. of Plate CCCLXXXVI. let *ab* be the given breadth of each step, and *ai* the height thereof. Make *bc*, *cd*, *de*, &c. each equal to *ab*; and draw all the upright lines *ai*, *bl*, *cn*, *dp*, &c. perpendicular to *ab* (to which the horizon *sS* is parallel); and from the points *i*, *l*, *n*, *p*, *r*, &c. draw the equidistant lines *iB*, *lC*, *nD*, &c. parallel to *ab*; these distances being equal to that of *iB* from *a*.

Draw *xi* touching all the corner-points *l*, *n*, *p*, *r*, *t*, *v*; and draw 16 parallel to *xi*, as far from it as you want the length of the steps to be.

Toward the point of sight S draw the lines *a 1*, *i 2*, *k 3*, *l 4*, &c. and draw 16 15, 14 13, 12 11, 10 9, 8 7, 6 5, 4 3, and 2 1, all parallel to *Ab*, and meeting the lines *w 15*, *u 13*, *s 11*, &c. in the points 15, 13, 11, 9, 7, 5, 3, and 1: then from these points draw 15 14, 13 12, 11 10, 9 8, 7 6, 5 4, and 3 2, all parallel to *ba*; and the outlines of the steps will be finished. From the point 16 draw 16 A parallel to *ba*, and *Ax 16* will be part of the flat at the top of the uppermost step. This done, shade the work as in fig. 2. and the whole will be finished.

PROB. 29. *To put stairs with flats and openings in perspective, standing on a horizontal pavement of squares.*

In fig. 3. of Plate CCCLXXXVI. having made S the point of sight, and drawn a reticulated pavement AB

with black lead lines, which may be rubbed out again; at any distance from the side AB of the pavement which is nearest to the eye, and at any point where you choose to begin the stair at that distance, as *a*, draw Ga parallel to BA, and take *ab* at pleasure for the height of each step.

Take *ab* in your compasses, and set that extent as many times upward from F to E as is equal to the first required number of steps O, N, M, L, K; and from these points of division in EF draw 1 *b*, 2 *d*, 3 *f*, 4 *h*, and E *k*, all equidistant from one another, and parallel to Fa: then draw the equidistant upright lines *ab*, *td*, *uf*, *vh*, *wk*, and *lm*, all perpendicular to Fa: then draw *mb*, touching the outer corners of these steps at *m*, *k*, *h*, *f*, *d*, and *b*; and draw *ns* parallel to *mb*, as far from it as you want the length of the steps K, L, M, N, O to be.

Towards the point of sight S draw *mn*, *ls*, *ko*, *ie*, *hp*, *fq*, *dr*, and *bs*. Then (parallel to the bottom-line BA) through the points *n*, *o*, *p*, *q*, *r*, *s*, draw *n 8*; *s*, *14*; *6*, *15*; *7*, *16*; *1*, *17*; and *2s*: which done, draw *n 5* and *o 6* parallel to *lm*, and the outlines of the steps K, L, M, N, O will be finished.

At equal distances with that between the lines marked 8 and 14, draw the parallel lines above marked 9 10 11 12 and 13; and draw perpendicular lines upwards from the points *n*, *o*, *p*, *q*, *r*, *s*, as in the figure.

Make Hm equal to the intended breadth of the flat above the square opening at the left hand, and draw HW toward the point of sight S, equal to the intended length of the flat; then draw WP parallel to Hm, and the outlines of the flat will be finished.

Take the width of the opening at pleasure, as from F to C, and draw CD equal and parallel to FE. Draw GH parallel to CD, and the short lines marked 33, 34, &c. just even with the parallel lines 1, 2, &c. From the points where these short lines meet CD draw lines toward the point of sight S till they meet DE; then from the points where the lines 38, 39, 40, &c. of the pavement meet Cy, draw upright lines parallel to CD; and the lines which form the opening will be finished.

The steps P, Q, R, S, T, and the flat U above the arch V, are done in the same manner with those in fig. 1. as taught in Prob. 28. and the equidistant parallel lines marked 18, 19, &c. are directly even with those on the left-hand side of the arch V, and the upright lines on the right-hand side are equidistant with those on the left.

From the points where the lines 18, 19, 20, &c. meet the right-hand side of the arch, draw lines toward the point of sight S; and from the points where the pavement lines 29, 30, 31, 32, meet the line drawn from A towards the point of sight, draw upright lines toward the top of the arch.

Having done the top of the arch, as in the figure, and the few steps to the right hand thereof, shade the whole as in fig. 4. and the work will be finished.

PROB. 30. *To put upright conical objects in perspective, as if standing on the sides of an oblong square, at distances from one another equal to the breadth of the oblong.*

In fig. 5. of Plate CCCLXXXVI. the bases of the upright cones are perspective circles inscribed in squares of the same diameter; and the cones are set upright on

on their bases by the same rules as are given for pyramids, which we need not repeat here.

In most of the foregoing operations we have considered the observer's eye to be above the level of the tops of all the objects, as if he viewed them when standing on high ground. In this figure, and the first and second of the next plate, we shall suppose him to be standing on low ground, and the tops of the objects to be above the level of his eye.

Plate
CCCLXXVI.

In fig. 5. let AD be the perspective breadth of the oblong square ABCD; and let Aa and Dd (equal to Aa) be taken for the diameters of the circular bases of the two cones next the eye, whose intended equal heights shall be AE and DF.

Having made S the point of sight in the horizon parallel to AD, and found the proper point of distance therein, draw AS and aS to contain the bases of the cones on the left-hand side, and DS and dS for those on the right.

Having made the two first cones at A and D of equal height at pleasure, draw ES and FS from their tops to the point of sight, for limiting the perspective heights of all the rest of the cones. Then divide the parallelogram ABCD into as many equal perspective squares as you please; find the bases of the cones at the corners of these squares, and make the cones thereon, as in the figure.

If you would represent a ceiling equal and parallel to ABCD, supported on the tops of these cones, draw EF, then EFGH shall be the ceiling; and by drawing ef parallel to EF, you will have the thickness of the floor-boards and beams, which may be what you please.

This shows how any number of equidistant pillars may be drawn of equal heights to support the ceiling of a long room, and how the walls of such a room may be represented in perspective at the backs of these pillars. It also shows how a street of houses may be drawn in perspective.

PROB. 31. *To put a square hollow in perspective, the depth of which shall bear any assigned proportion to its width.*

Fig. 1. of Plate CCCLXXXVII. is the representation of a square hollow, of which the depth AG is equal to three times its width AD; and S is the point of sight over which the observer's eye is supposed to be placed, looking perpendicularly down into it, but not directly over the middle.

Draw AS and DS to the point of sight S; make ST the horizon parallel to AD, and produce it to such a length beyond T that you may find a point of distance therein not nearer S than if AD was seen under an angle of 60 degrees.

Draw DU to the point of distance, intersecting AS in B; then from the point B draw BC parallel to AD; and you will have the first perspective square ABCD, equal to a third part of the intended depth.

Draw CV to the point of distance, intersecting AS in E; then from the point E draw EF parallel to AD; and you will have the second perspective square BEFC, which, added to the former one, makes two-thirds of the intended depth.

Draw FW to the point of distance, intersecting AS in G; then from the point G draw GH parallel to AD; and you will have the third perspective square

EGHF, which, with the former two, makes the whole depth AGHD three times as great as the width AD, in a perspective view.

Divide AD into any number of equal parts, as suppose 8; and from the division-points a, b, c, d, &c. draw lines toward the point of sight S, and ending at GH; then through the points where the diagonals BD, EC, GF, cut these lines, draw lines parallel to AD; and you will have the parallelogram AGHD reticulated, or divided into 192 small and equal perspective squares.

Make Al and DM equal and perpendicular to AD; then draw IM, which will be equal and parallel to AD; and draw IS and MS to the point of sight S.

Divide AI, IM, and MD, into the same number of equal parts as AD is divided; and from these points of division draw lines toward the point of sight S, ending respectively at GK, KL, and LH.

From those points where the lines parallel to AD meet AG and DH draw upright lines parallel to AI and DM; and from the points where these lines meet IK and LM draw lines parallel to IM; then shade the work, as in the figure.

PROB. 32. *To represent a semicircular arch in perspective, as if it were standing on two upright walls, equal in height to the height of the observer's eye.*

After having gone through the preceding operation, this will be more easy by a bare view of fig. 2. in Plate CCCLXXXVII. than it could be made by any description; the method being so much like that of drawing and shading the square hollow.—We need only mention, that aT/EA and DFctd are the upright walls on which the semicircular arch is built; that S is the point of sight in the horizon Tt, taken in the centre of the arch; that d in fig. 1. is the point of distance; and that the two perspective squares ABCD and BEFC make the parallelogram AEFD of a length equal to twice its breadth AD.

PROB. 33. *To represent a square in perspective, as viewed by an observer standing directly even with one of its corners.*

In fig. 3. of Plate CCCLXXXVII. let A9BC be a true square, viewed by an observer standing at some distance from the corner C, and just even with the diagonal C9.

Let pSP be the horizon, parallel to the diagonal AB; and S the point of sight, even with the diagonal C9. Here it will be proper to have two points of distance p and P, equidistant from the point of sight S.

Draw the straight line 1 17 parallel to AB, and draw A8 and B10 parallel to CS. Take the distance between 8 and 9 in your compasses, and set it off all the way in equal parts from 8 to 1, and from 10 to 17.—The line 1 17 should be produced a good way further both to right and left hand from 9, and divided all the way in the same manner.

From these points of equal division, 8, 9, 10, &c. draw lines to the point of sight S, and also to the two points of distance p and P, as in the figure.

Now it is plain, that acb9 is the perspective representation of A9BC, viewed by an observer even with the corner C and diagonal C9.—But if there are other such squares lying even with this, and having the same position with respect to the line 1 17, it is evident that the observer, who stands directly even with the

corner C of the first square, will not be even with the like corners G and K of the others; but will have an oblique view of them over the files FG and IK, which are nearest his eye; and their perspective representations will be gpr and hki , drawn among the lines in the figure; of which, the spaces taken up by each side be between three of the lines drawn toward the point of distance p , and three drawn to the other point of distance P .

PROB. 34. To represent a common chair, in an oblique in perspective view.

Take any part of the plane of the floor, and draw lines to the point of sight S, and points of distance p and P , being drawn as in the preceding operation, either any part of the plane, as lmn 13, on which you would have the chair L to stand.—There are just as many lines (namely two) between l and m or 13 and n , drawn toward the point of distance p , at the left hand, as between l and 13 , or m and n , drawn to the point of distance P on the right: so that lm , $m13$, $13n$, and nl , form a perspective square.

From the four corners l , m , n , 13 , of this square raise the four legs of the chair to the perspective perpendicular height you would have them: then make the seat of the chair a square equal and parallel to lmn 13, as taught in Prob. 18. which will make the two sides of the seat in the direction of the lines drawn toward the point of distance p , and the fore and back part of the seat in direction of the lines drawn to the other point of distance P . This done, draw the back of the chair leaning a little backward, and the cross bars therein tending toward the point of distance P . Then shade the work as in the figure; and the perspective chair will be finished.

PROB. 35. To present an oblong square table in an oblique perspective view.

In fig. 2. of Plate CCCLXXXVII. M is an oblong square table, as seen by an observer standing directly even with C q (see Prob. 33.), the side next the eye being perfectly parallel to the side ac of the square $acbg$.—The forementioned lines drawn from the line 1 17 to the two points of distance p and P , form equal perspective squares on the ground plane.

Choose any part of this plane of squares for the feet of the table to stand upon; as at p , q , r , and s , in direction of the lines ap and rs for the two long sides, and ts and qr for the two ends; and you will have the oblong square or parallelogram $qrst$ for the part of the floor or ground-plane whereon the table is to stand: and the breadth of this plane is here taken in proportion to the length as 6 to 10; so that, if the length of the table be ten feet, its breadth will be six.

On the four little perspective squares at q , r , s , and t , place the four upright legs of the table, of what height you please, so that the height of the two next the eye, at q and p , shall be terminated by a straight line uv drawn to the point of distance P . This done, make the leaf M of the table an oblong square, perspective equal and parallel to the oblong square $qrst$ on which the feet of the table stand. Then shade the whole, as in the figure, and the work will be finished.

If the line 1 17 was prolonged to the right and left hand, and equally divided throughout (as it is from 1 to 17), and if the lines which are drawn from p and to the right and left hand sides of the plate were

prolonged till they came to the extended line 1 17, they would meet it in the equal points of division. In forming large plans of this sort, the ends of slips of paper may be pasted to the right and left edges of the sheet on which the plan is to be formed.

Of the Anamorphosis, or reformation of distorted images.

By this means pictures that are so misshapen, as to exhibit no regular appearance of any thing to the naked eye, shall, when viewed by reflection, present a regular and beautiful image. The inventor of this ingenious device is not known. Simon Stevinus, who was the first that wrote upon it, does not inform us from whom he learned it. The principles of it are laid down by S. Vauzel in his *Perspective Unique et Cyndrique*; and Gaspar Schott professes to copy Martin Bettinus in his description of this piece of artificial magic.

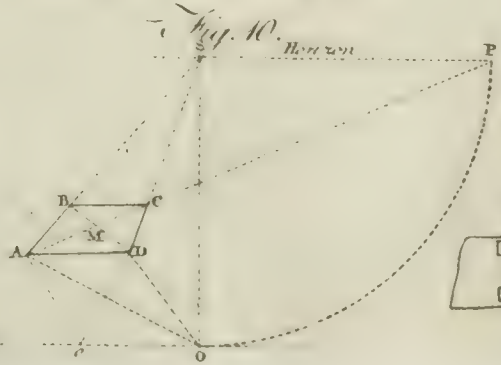
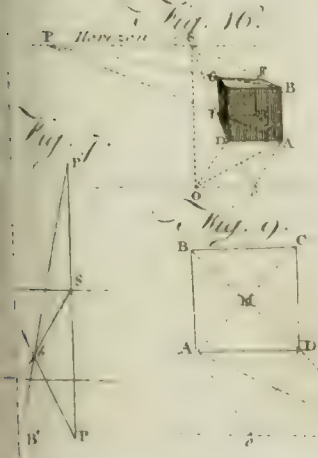
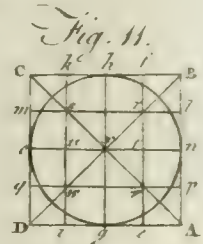
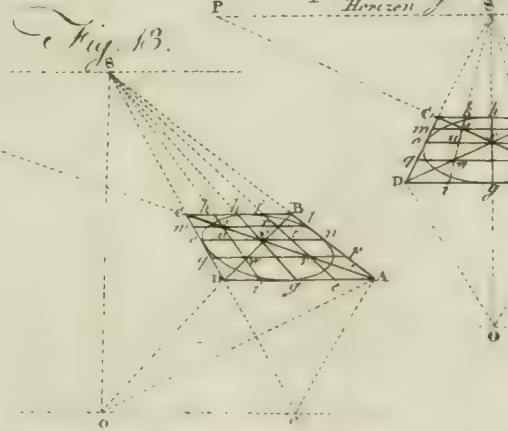
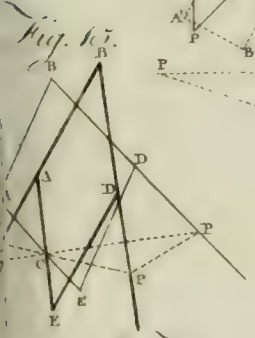
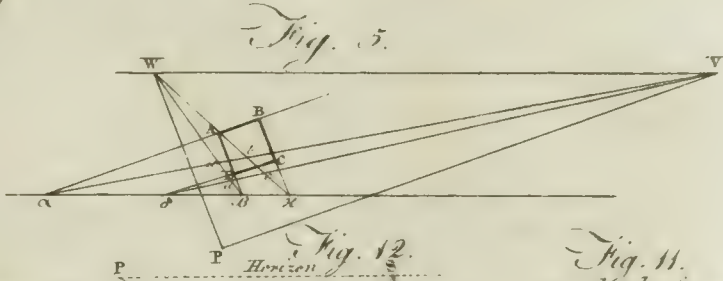
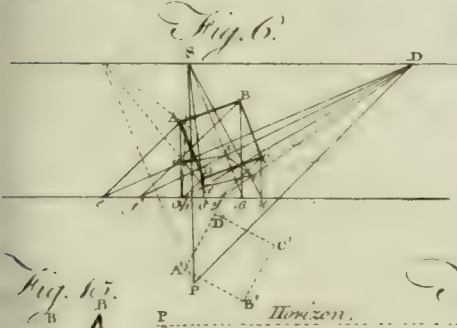
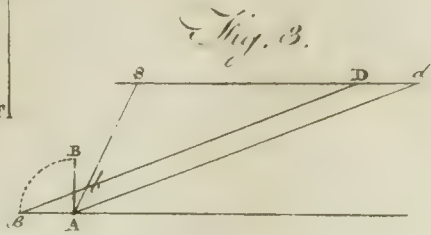
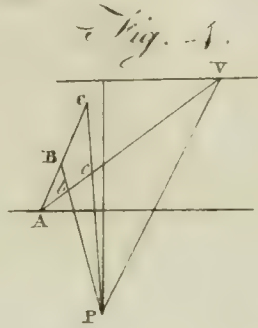
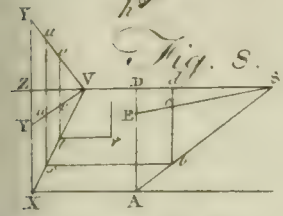
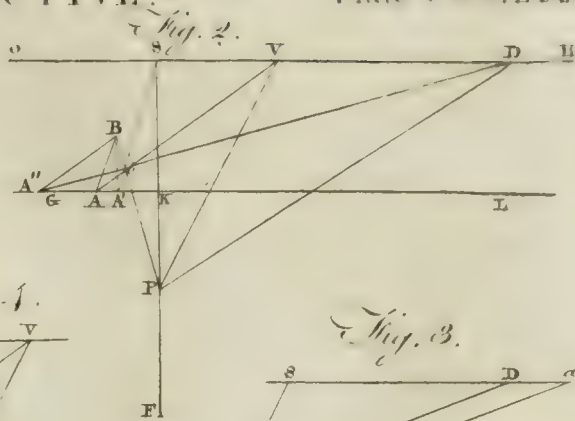
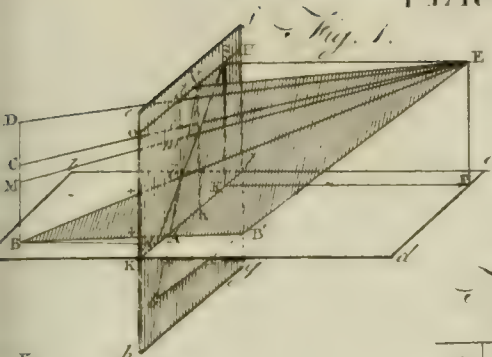
It will be sufficient for our purpose to copy one of the simplest figures of this writer, as by this means the mystery of this art will be sufficiently unfolded. Upon the cylinder of paper, or pasteboard, ABCD, draw whatever is intended to be exhibited, as the letters IHIS. Then with a needle make perforations along the whole outline; and placing a candle, G, behind this cylinder, mark upon the ground plane the shadow of them, which will be distorted more or less, according to the position of the candle or the plane, &c. This being done, let the picture be an exact copy of this distorted image, let a metallic speculum be substituted in the place of the cylinder, and let the eye of the spectator have the same position before the cylinder that the candle had behind it. Then looking upon the speculum, he will see the distorted image restored to its proper shape. The reformation of the image, he says, will not easily be made exact in this method, but it will be sufficiently so to answer the purpose.

Other methods, more exact and geometrical than this, were found out afterwards: so that these pictures could be drawn by certain rules, without the use of a candle. Schott quotes one of these methods from Bettinus, another from Herigonius, and another from Kircher, which may be seen in his *Magia*, vol. i. p. 162, &c. He also gives an account of the methods of reforming pictures by speculums of conical and other figures.

Instead of copying any of these methods from Schott or Bettinus, we shall present our readers with that which Dr Smith hath given us in his *Optics*, vol. i. p. 250, as, no doubt, the best, and from which any person may easily make a drawing of this kind. The same description answers to two mirrors, one of which, fig. 7. is convex, and the other, fig. 8. is concave.

In order to print upon a plane a deformed copy ABCDEKIHGF of an original picture, which shall appear regular, when seen from a given point O, elevated above the plane, by rays reflected from a polished cylinder, placed upon the circle lnp , equal to its given base; from the point R, which must be supposed to be perpendicularly under O, the place of the eye, draw two lines R a R e; which shall either touch the late of the cylinder, or else cut off two small equal segments from the sides of it, according as the copy is intended to be more or less deformed. Then, raising the eye, raised above R, to the given height RO, some.

Plate
CCCLXXXVII
fig. 6.



Whitell, Prin. Nat. Sculptor, Scot.

Fig. 1.

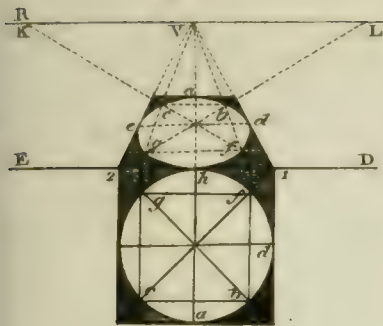


Fig. 2.

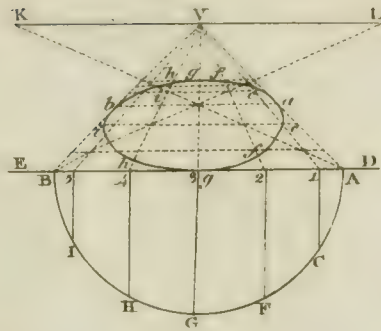


Fig. 1. 171.

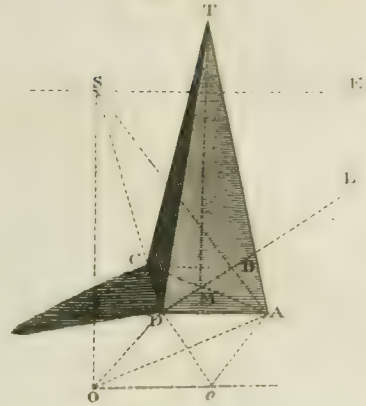


Fig. 3.

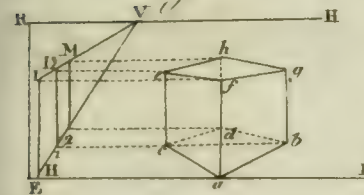


Fig. 5.

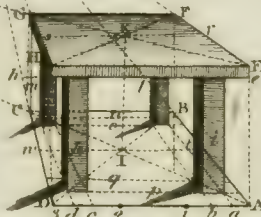
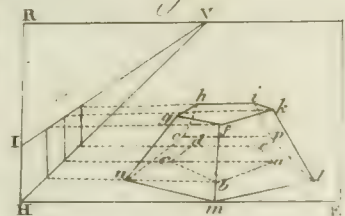


Fig. 4. 1.^o 2.



Fig. 6.



- Fig. 7. $\lambda_{\infty}^{(1)}$.

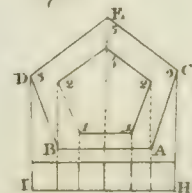


Fig. 7. 182.

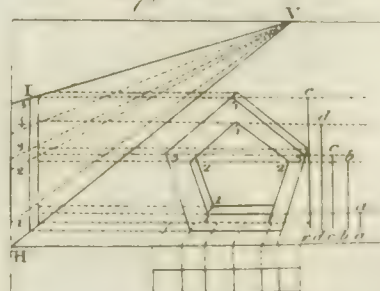


Fig. 8. 4.^o 2.

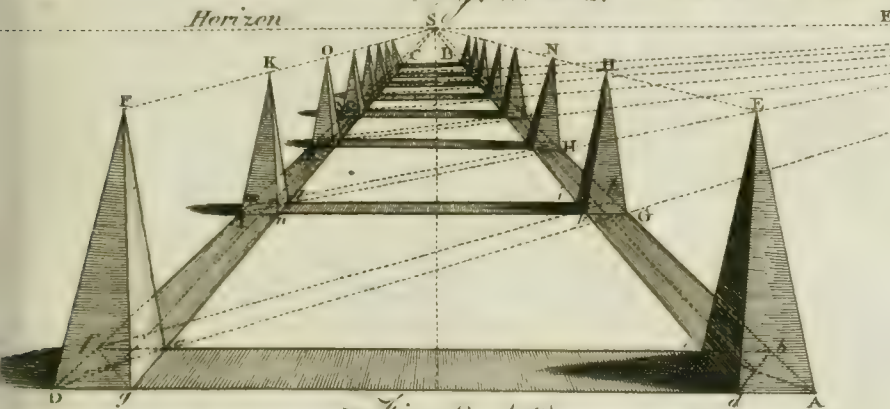


Fig. 8. 1/1.

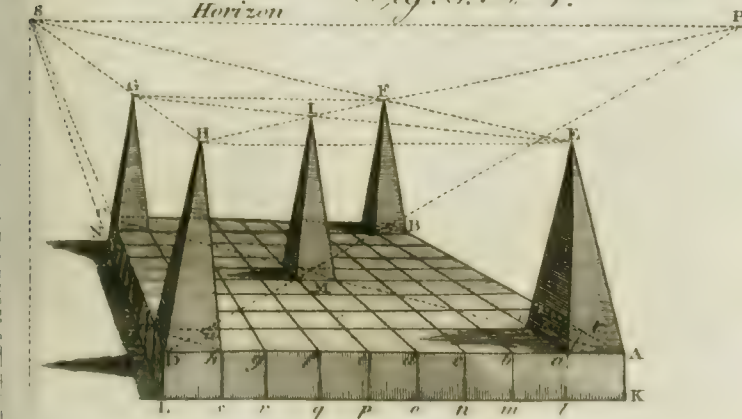


Fig. 1. Horizon.

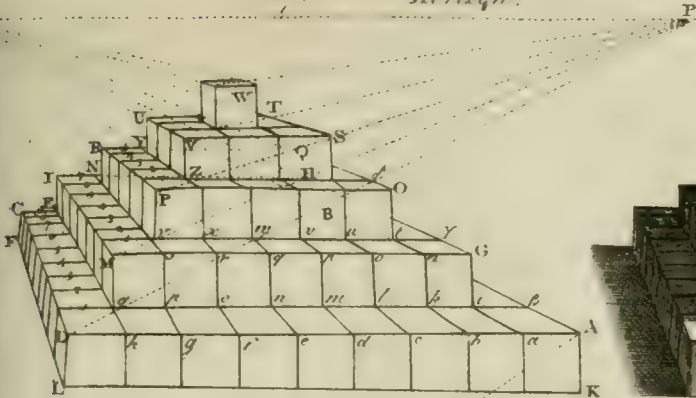


Fig. 2.

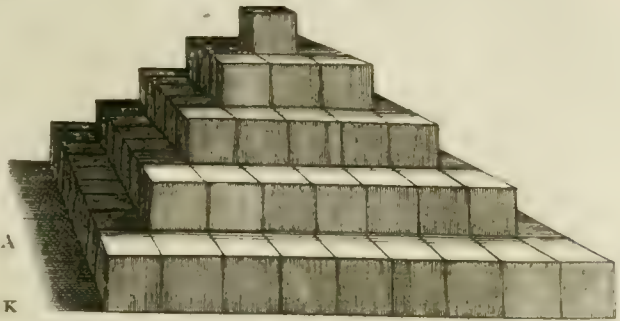


Fig. 3.

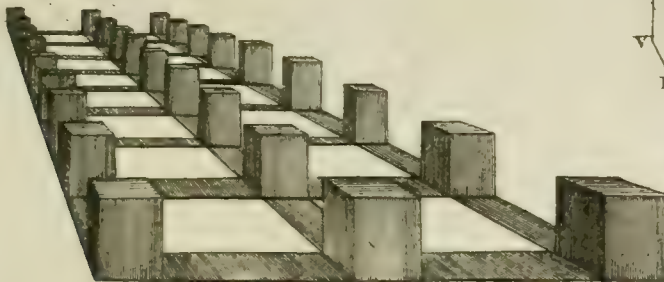


Fig. 4. Horizon.

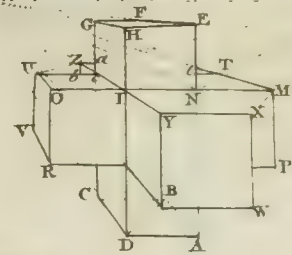


Fig. 5. Horizon.



Fig. 6.

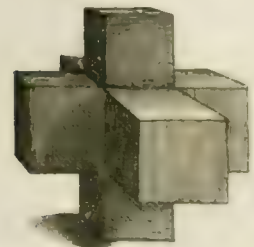


Fig. 6.



Fig. 3.

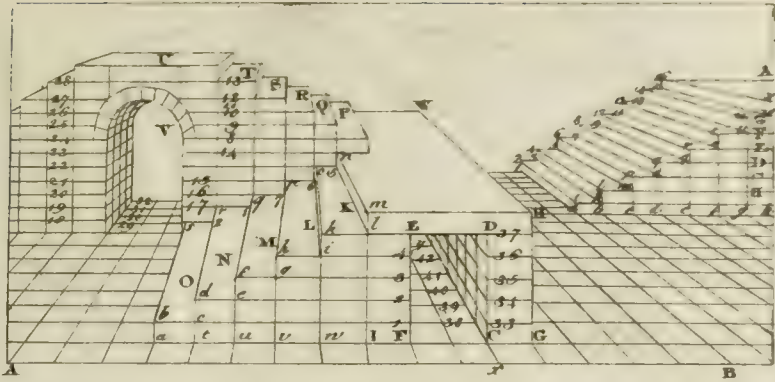


Fig. 1.

Fig. 4.

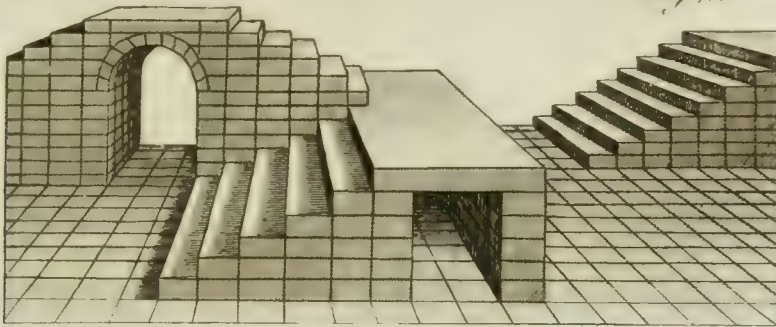


Fig. 2.

Fig. 7.

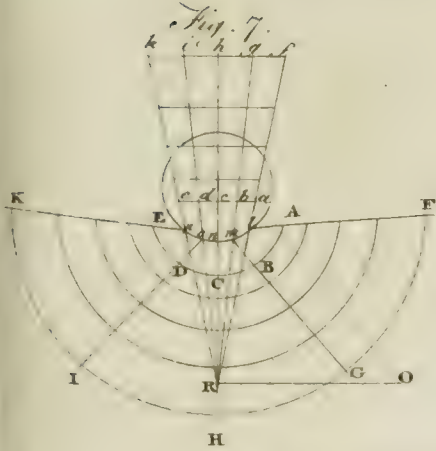


Fig. 8.

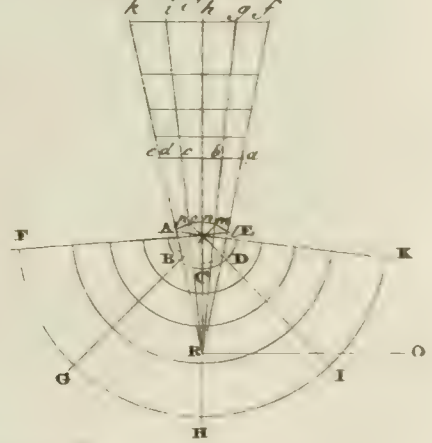


Fig. 5.

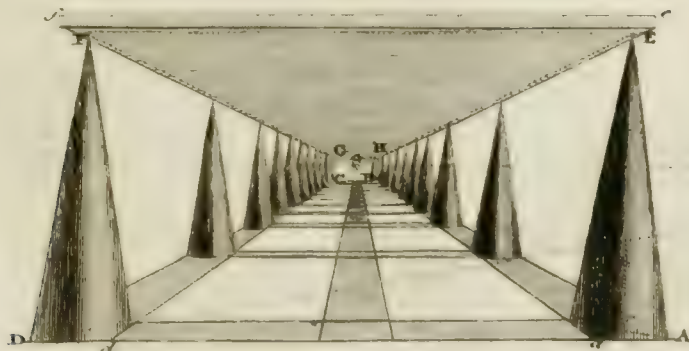


Fig. 2.

PERSPECTIVE.

Plate CCCLXXXVII.

Fig. 1.

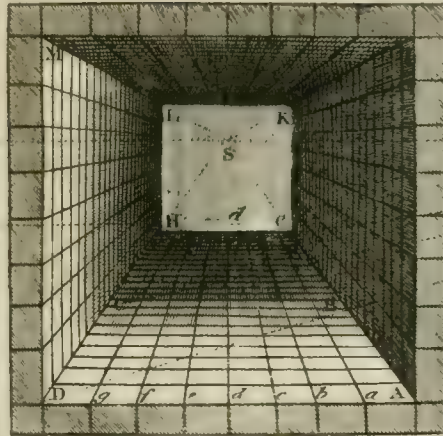
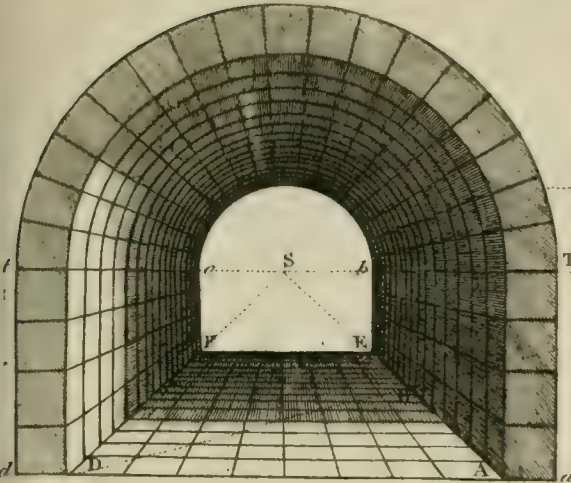


Fig. 3.

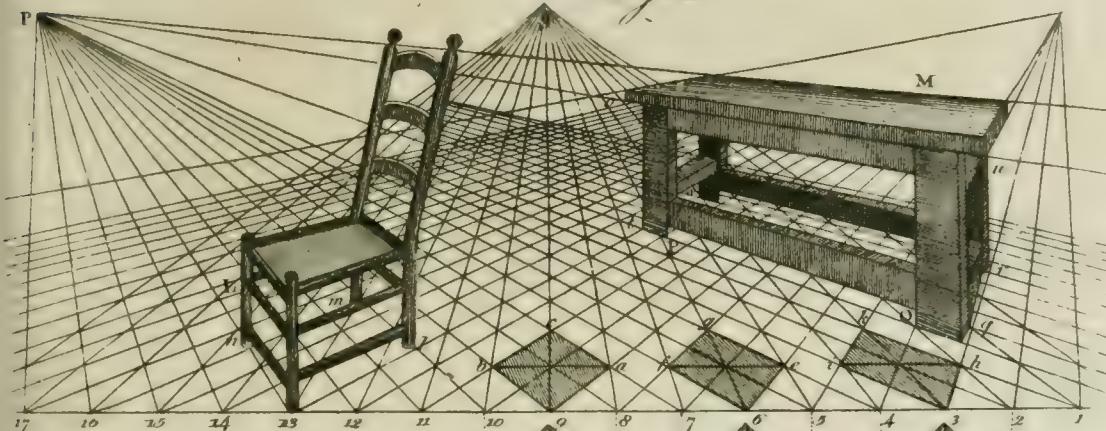


Fig. 4.

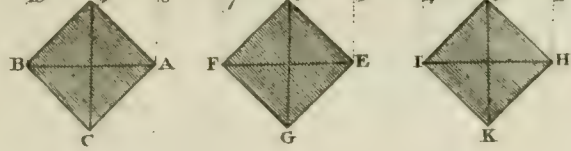
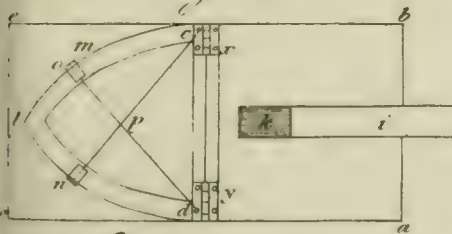
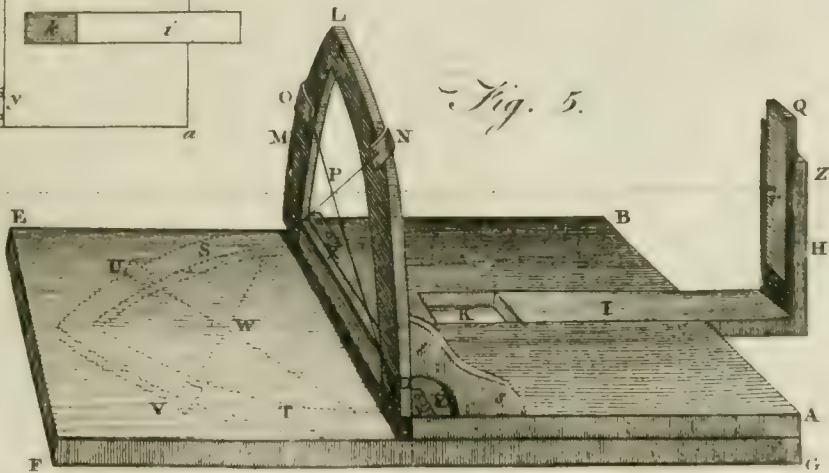
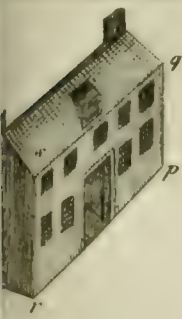


Fig. 5.



somewhat greater than that of the cylinder, for a luminous point, describe the shadow $a e k f$ (of a square $a e x z$, fig. 36. or parallelogram standing upright upon its base $a e$, and containing the picture required) anywhere behind the arch $l n p$. Let the lines drawn from R to the extremities and divisions of the base a, b, c, d, e , cut the remotest part of the shadow in the points f, g, h, i, k , and the arch of the base in l, m, n, o, p ; from which points draw the lines $/AF, mBG, nCH, oDI, pEK$, as if they were rays of light that came from a focus R , and were reflected from the base $l n p$; so that each couple, as $/A, /R$, produced, may cut off equal segments from the circle. Lastly, transfer the lines $/a f, m b g$, &c. and all their parts, in the same order, upon the respective lines $/AF, mBG$, &c. and having drawn regular curves, by estimation, through the points A, B, C, D, E , through F, G, H, I, K , and through every intermediate order of points; the figure $ACEKHF$, so divided, will be the deformed copy of the square, drawn and divided upon the original picture, and will appear similar to it, when seen in the polished cylinder, placed upon the base $l n p$, by the eye in its given place O .

The practical methods of drawing these images seem to have been carried to the greatest perfection by J. Leopold, who, in the *Acta Lipsienfis* for the year 1712, has described two machines, one for the images to be viewed with a cylindrical, and the other with a conical, mirror. The person possessed of this instrument has nothing to do but to take any print he pleases, and while he goes over the outlines of it with one pen, another traces the anamorphosis.

By methods of this kind, groves of trees may be cut, so as to represent the appearance of men, horses, and other objects from some one point of view, which are not at all discernible in any other. This might easily be effected by one person placing himself in any particular situation, and giving directions to other persons what trees to lop, and in what manner. In the same method it has been contrived, that buildings of circular and other forms, and also whole groups of buildings, consisting of walls at different distances, and with different positions to one another, should be painted so as to exhibit the exact representation of particular objects, which could only be perceived in one situation. Bettinus has illustrated this method by drawings in his *Apiaria*.

It may appear a bold assertion to say, that the very short sketch now given of the art of perspective is a sufficient foundation for the whole practice, and includes *all* the expeditious rules peculiar to the problems which most generally occur. It is, however, true, and the intelligent reader will see, that the two theorems on which the whole rests, include every possible case, and apply with equal facility to pictures and originals in any position, although the examples are selected of perpendicular pictures, and of originals referred to horizontal planes, as being the most frequent. The scientific foundation being so simple, the structure need not be complex, nor swell into such volumes as have been published on the subject: volumes which, by their size, deter from the perusal, and give the simple art the appearance of intricate mystery; and,

by their prices, defeat the design of their authors, viz. the dissemination of knowledge among the practitioners. The treatises on perspective acquire their bulk by long and tedious discourses, minute explanations of common things, or by great numbers of examples; which indeed do make some of these books valuable by the variety of curious cuts, but do not at all instruct the reader by any improvements made in the art itself. For it is evident, that most of those who have treated this subject have been more conversant in the practice of designing than in the principles of geometry; and therefore when, in their practice, the cases which have offered have put them on trying particular expedients, they have thought them worth communicating to the public as improvements of the art; and each author, fond of his own little expedient (which a scientific person would have known for an easy corollary from the general theorem), have made it the principle of a practical system—and in this manner narrowing instead of enlarging the knowledge of the art; and the practitioner, tired of the bulk of the volume, in which a single maxim is tediously spread out, and the principle on which it is founded kept out of his sight, contents himself with a remembrance of the maxim (not understood), and keeps it slightly in his eye, to avoid gross errors. We can appeal to the whole body of painters and draughtsmen for the truth of this assertion; and it must not be considered as an imputation on them of remissness or negligence, but as a necessary consequence of the ignorance of the authors from whom they have taken their information. This is a strong term, but it is not the less just. Several mathematicians of eminence have written on perspective, treating it as the subject of pure geometry, as it really is; and the performances of Dr Brook Taylor, Gravesande, Wolf, De la Caille, Emerson, are truly valuable, by presenting the art in all its perspicuous simplicity and universality. The works of Taylor and Emerson are more valuable, on account of the very ingenious and expeditious constructions which they have given, suited to every possible case. The merit of the first author has been universally acknowledged by all the British writers on the subject, who never fail to declare that their own works are composed on the principle of Dr Brook Taylor: but any man of science will see that these authors have either not understood them, or aimed at pleasing the public by fine cuts and uncommon cases; for, without exception, they have omitted his favourite constructions, which had gained his predilection by their universality, and attached themselves to inferior methods, more usually expedient perhaps, or inventions (as they thought) of their own. What has been given in this article is not *professed* to be according to the principles of Dr Brook Taylor, because the principles are not peculiar to him, but the necessary results of the theory itself, and inculcated by every mathematician who had taken the trouble to consider the subject. They are sufficient not only for directing the ordinary practice, but also for suggesting modes of construction for every case out of the common track. And a person of ingenuity will have a laudable enjoyment in thus, without much stretch of thought, inventing rules for himself; and will be better pleased with such fruits of his own ingenuity, than in reading the tedious explanations of examples devised

by another. And for this purpose we would, with Dr Taylor, "advise all our readers not to be contented with the scheme they find here; but, on every occasion, to draw new ones of their own, in all the variety of circumstances they can think of. This will take up more time at first, but they will find the vast benefit and pleasure of it by the extensive notions it will give them of the nature of the principles."

The art of perspective is necessary to all arts where there is any occasion for designing; as architecture, fortification, carving, and generally all the mechanical arts; but it is more particularly necessary to the art of painting, which can do nothing without it. A figure in a picture, which is not drawn according to the rules of perspective, does not represent what is intended, but something else. Indeed we hesitate not to say, that a picture which is faulty in this particular, is as blameable, or more so, than any composition in writing which is faulty in point of orthography, or grammar. It is generally thought very ridiculous to pretend to write an heroic poem, or a fine discourse, upon any subject, without understanding the propriety of the language in which we write; and to us it seems no less ridiculous for one to pretend to make a good picture without understanding perspective: Yet how many pictures are there to be seen, that are highly valuable in other respects, and yet are entirely faulty in this point? Indeed this fault is so very general, that we cannot remember that we ever have seen a picture that has been entirely without it; and what is the more to be lamented, the greatest masters have been the most guilty of it. Those examples make it to be the less regarded; but the fault is not the less, but the more to be lamented, and deserves the more care in avoiding it for the future. The great occasion of this fault, is certainly the wrong method that is generally used in educating of persons in this art: for the young people are generally put immediately to drawing; and when they have acquired a facility in that, they are put to colouring. And these things they learn by rote, and by practice only; but are not at all instructed in any rules of art. By which means, when they come to make any designs of their own, though they are very expert at drawing out and colouring every thing that offers itself to their fancy; yet for want of being instructed in the strict rules of art, they do not know how to govern their inventions with judgment, and become guilty of so many gross mistakes; which prevent themselves, as well as others, from finding that satisfaction they otherwise would do in their performances. To correct this for the future, we would recommend it to the masters of the art of painting, to consider if it would not be necessary to establish a better method for the education of their scholars, and to begin their instructions with the technical parts of painting, before they let them loose to follow the inventions of their own uncultivated imaginations.

The art of painting, taken in its full extent, consists of two parts; the inventive, and the executive. The inventive part is common with poetry, and belongs more properly and immediately to the original design (which it invents and disposes in the most proper and agreeable manner) than to the picture, which is only a copy of that design already formed in the imagination of the artist. The perfection of this art of painting depends upon the thorough knowledge the artist has of all the parts of his subject; and the beauty of it consists in the happy choice and disposition that he makes of it: And it is in this that the genius of the artist discovers and shows itself, while he indulges and humours his fancy, which here is not confined. But the other, the executive part of painting, is wholly confined and strictly tied to the rules of art, which cannot be dispensed with upon any account; and therefore in this the artist ought to govern himself entirely by the rules of art, and not to take any liberties whatsoever. For any thing that is not truly drawn according to the rules of perspective, or not truly coloured or truly shaded, does not appear to be what the artist intended, but something else. Wherefore, if at any time the artist happens to imagine that his picture would look the better, if he should swerve a little from these rules, he may assure himself, that the fault belongs to his original design, and not to the strictness of the rules; for what is perfectly agreeable and just in the real original objects themselves, can never appear defective in a picture where those objects are exactly copied.

Therefore to offer a short hint of thoughts we have some time had upon the method which ought to be followed in instructing a scholar in the executive part of painting; we would first have him learn the most common effects of practical geometry, and the first elements of plain geometry and common arithmetic. When he is sufficiently perfect in these, we would have him learn perspective. And when he has made some progress in this, so as to have prepared his judgment with the right notions of the alterations that figures must undergo, when they come to be drawn on a flat, he may then be put to drawing by view, and be exercised in this along with perspective, till he comes to be sufficiently perfect in both. Nothing ought to be more familiar to a painter than perspective; for it is the only thing that can make the judgment correct, and will help the fancy to invent with ten times the ease that it could do without it.

We earnestly recommend to our readers the careful perusal of Dr Taylor's Treatise, as published by Colson in 1749, and Emerson's published along with his Optics. They will be surprised and delighted with the instruction they will receive; and will then truly estimate the splendid volumes of other authors and see their frivolity.

P E R

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Perspec-
tive.

PERSPECTIVE is also used for a kind of picture or painting, frequently seen in gardens, and at the ends of galleries; designed expressly to deceive the sight by

representing the continuation of an alley, a building, landscape, or the like.

Aerial PERSPECTIVE, is sometimes used as a general de-
deno-

perspective. denomination for that which more restrictedly is called *aerial perspective*, or the art of giving a due diminution or degradation to the strength of light, shade, and colours of objects, according to their different distances, the quantity of light which falls upon them, and the medium through which they are seen; the *chiaro oscuro*, or *clair obscure*, which consists in expressing the different degrees of light, shade, and colour of bodies, arising from their own shape, and the position of their parts with respect to the eye and neighbouring objects, whereby their light or colours are affected; and keeping, which is the observance of a due proportion in the general light and colouring of the whole picture, so that no light or colour in one part may be too bright or strong for another. A painter, who would succeed in *aerial perspective*, ought carefully to study the effects which distance, or different degrees or colours of light, have on each particular original colour, to know how its hue or strength is changed in the several circumstances that occur, and to represent it accordingly. As all objects in a picture take their measures in proportion to those placed in the front, so, in *aerial perspective*, the strength of light, and the brightness of the colours of objects close to the picture, must serve as a measure, with respect to which all the same colours at several distances must have a proportional degradation in like circumstances.

Bird's eye view in PERSPECTIVE, is that which supposes the eye to be placed above any building, &c. as in the air at a considerable distance from it. This is applied in drawing the representations of fortifications, when it is necessary not only to exhibit one view as seen from the ground, but so much of the several buildings as the eye can possibly take in at one time from any situation. In order to this, we must suppose the eye to be removed a considerable height above the ground, and to be placed as it were in the air, so as to look down into the building like a bird that is flying. In representations of this kind, the higher the horizontal line is placed; the more of the fortification will be seen, and *vice versa*.

PERSPECTIVE Machine, is an instrument by which any person, without the help of the rules of art, may delineate the true perspective figures of objects. Mr Ferguson has described a machine of this sort of which he ascribes the invention to Dr Bevis.

Fig. 4. of Plate CCCLXXXVII. is a plane of this machine, and fig. 5. is a representation of it when made use of in drawing distant objects in perspective.

In fig. 4. *abef* is an oblong square board, represented by *ABEF* in fig. 5. *x* and *y* (*X* and *Y*) are two hinges on which the part *cld* (*CLD*) is moveable. This part consists of two arches or portions of circles *cml* (*CML*) and *dnl* (*DNL*) joined together at the top *l* (*L*), and at bottom to the cross bar *dc* (*DC*), to which one part of each hinge is fixed, and the other part to a flat board, half the length of the board *abef* (*ABEF*), and glued to its uppermost side. The centre of the arch *cml* is at *d*, and the centre of the arch *dnl* is at *c*.

On the outer side of the arch *dnl* is a sliding piece *n* (much like the nut of the quadrant of altitude belonging to a common globe), which may be moved to any part of the arch between *d* and *l*; and there is such another slider *o* on the arch *cml*, which may be

set to any part between *c* and *l*.—A thread *cpn* (*CPN*) is stretched tight from the centre *c* (*C*) to the slider *n* (*N*), and such another thread is stretched from the centre *d* (*D*) to the slider *o* (*O*); the ends of the threads being fastened to these centres and sliders.

Now it is plain, that, by moving these sliders on their respective arches, the intersection *p* (*P*) of the threads may be brought to any point of the open space within the arches.—In the groove *k* (*K*) is a straight sliding bar *i* (*I*), which may be drawn further out, or pushed further in at pleasure.

To the outer end of this bar *I* (fig. 5.) is fixed the upright piece *HZ*, in which is a groove for receiving the sliding piece *Q*. In this slider is a small hole *r* for the eye to look through, in using the machine: and there is a long slit in *HZ*, to let the hole *r* be seen through when the eye is placed behind it, at any height of the hole above the level of the bar *I*.

How to delineate the perspective figure of any distant object, or objects, by means of this machine.

Suppose you wanted to delineate a perspective representation of the house *qrstp* (which we must imagine to be a great way off, without the limits of the plate), place the machine on a steady table, with the end *EF* of the horizontal board *ABEF* toward the house, so that, when the Gothic-like arch *DLC* is set upright, the middle part of the open space (about *P*) within it may be even with the house when you place your eye at *Z* and look at the house through the small hole *r*. Then fix the corners of a square piece of paper with four wafers on the surface of that half of the horizontal board which is nearest the house; and all is ready for drawing.

Set the arch upright, as in the figure; which it will be when it comes to the perpendicular side *t* of the upright piece *st* fixed to the horizontal board behind *D*. Then place your eye at *Z*, and look through the hole *r* at any point of the house, as *q*, and move the sliders *N* and *O* till you bring the intersection of the threads at *P* directly between your eye and the point *q*; then put down the arch flat upon the paper on the board, as at *ST*, and the intersection of the threads will be at *W*. Mark the point *W* on the paper with the dot of a black lead pencil, and set the arch upright again as before: then look through the hole *r*, and move the sliders *N* and *O* till the intersection of the threads comes between your eye and any other point of the house, as *p*; then put down the arch again to the paper, and make a pencil mark thereon at the intersection of the threads, and draw a line from that mark to the former one at *W*; which line will be a true perspective representation of the corner *pq* of the house.

Proceed in the same manner, by bringing the intersection of the threads successively between your eye and other points of the outlines of the house, as *r*, *s*, &c. and put down the arch to mark the like points on the paper, at the intersection of the threads: then connect these points by straight lines, which will be the perspective outlines of the house. In like manner find points for the corners of the door and windows, top of the house, chimneys, &c. and draw the finishing lines from point to point: then shade the whole, making the lights and shades as you see them on the house itself, and you will have a true perspective figure of it.—Great care must be taken, during the whole time, that

*Perspec-
tive,
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tion.*

the position of the machine be not shifted on the table ; and to prevent such an inconvenience, the table should be very strong and steady, and the machine fixed to it either by screws or clamps.

In the same way, a landscape, or any number of objects within the field of view through the arch, may be delineated, by finding a sufficient number of perspective points on the paper, and connecting them by straight or curved lines as they appear to the eye. And as this makes every thing in perspective equally easy, without taking the trouble to learn any of the rules for drawing, the operations must be very pleasing and agreeable. Yet as science is still more so, we would by all means recommend it to our readers to learn the rules for drawing particular objects; and to draw landscapes by the eye, for which, we believe, no perspective rules can be given. And although any thing may be very truly drawn in perspective by means of this machine, it cannot be said that there is the least degree of science in going that way to work.

The arch ought to be at least a foot wide at bottom, that the eye at Z may have a large field of view through it : and the eye should then be, at least, 10½ inches from the intersection of the threads at P when the arch is set upright. For if it be nearer, the boundaries of view at the sides near the foot of the arch will subtend an angle at Z of more than 60 degrees, which will not only strain the eye, but will also cause the outermost parts of the drawing to have a disagreeable appearance.—To avoid this, it will be proper to draw back the sliding bar I, till Z be 14½ inches distant from P; and then the whole field of view, through the foot wide arch, will not subtend an angle to the eye at Z of more than 45 degrees; which will give a more easy and pleasant view, not only of all the objects themselves, but also of their representations on the paper whereon they are delineated. So that, whatever the width of the arch be, the distance of the eye from it should be in this proportion : As 12 is to the width of the arch, so is 14½ to the distance of the eye (at Z) from it.

If a pane of glass, laid over with gum water, be fixed into the arch, and set upright when dry, a person who looks through the hole r may delineate the objects upon the glass which he sees at a distance through and beyond it, and then transfer the delineation to a paper put upon the glass, as mentioned in the beginning of the article PERSPECTIVE.

Mr Peacock likewise invented three simple instruments for drawing architecture and machinery in perspective, of which the reader will find sketches and descriptions in the 75th volume of the Philosophical Transactions. We do not insert these descriptions here, because we do not think the instruments superior to that described by Ferguson, and because we wish that our readers who have occasion to draw may make themselves so much masters of the art of perspective, as to be above the aid of such mechanical contrivances.

PERSPECTIVE Glass, or Graphical Perspective. See DIOPTRICS.

PERSPIRATION, in medicine, the evacuation of the juices of the body through the pores of the skin. Perspiration is distinguished into sensible and insensible; and here sensible perspiration is the same

with sweating, and insensible perspiration that which escapes the notice of the senses; and this last is the idea affixed to the word *perspiration* when used alone.

PERSPICUITY, properly signifies the property which any thing has of being easily seen through; hence it is generally applied to such writings or discourses as are easily understood.

PERSPICUITY, in composition. See ORATORY. n° 43.

PERTH, a county of Scotland, including Menteith, Braidalbin, Athol, Stratherne, part of Gowrie, and Perth Proper; is bounded by Badenach and Lochaber on the north and north-west, by Marr on the north-east; by Argyll and Lennox on the west and south-west; having Clackmannanshire, part of Stirlingshire, and the Forth to the south; the shires of Kinross and Fife to the south-east, and Angus to the east. It extends above 70 miles in length, and near 60 at its greatest breadth, exhibiting a variety of Highlands and Lowlands; mountains, hills, dales, and straths, diversified with pasture-grounds, corn fields, and meadows; rivers, lakes, forests, woods, plantations, inclosures, towns, villages, and a great number of elegant seats, beautifully situated, belonging to noblemen and gentlemen. The chief rivers of Perthshire are the Tay, the Teith, and the Erne, besides a great number of subordinate streams. The river Teith is famous for its salmon-fishery, and its deep cataract, near the Blair of Drummond, the noise of which is so loud, as to deafen those who approach it. The river Erne rises from Loch-Erne, a lake seven miles long, in the mountainous country of Stratherne: this river, after a course of 34 miles from west to east, during which it receives many streams and rivulets, falls into the Tay at Abernethy.

Freestone, lead, iron, and copper ores, with some lapis calaminaris, are found in different parts of Perthshire. The soil, being generally rich and well manured, produces excellent wheat, and all kinds of grain. The hilly country abounds with pasture for the black cattle, horses, sheep, goats, and deer. The heaths, woods, and forests, are stored with variety of game; the rivers teem with salmon and trout; the gardens and orchards are stored with all kinds of herbs, roots, apples, pears, cherries, plums, and almost every species of fruit found in South Britain. The houses and attire, even of the commonalty, are neat and decent; and every peasant can produce a good quantity of linen, and great store of blankets, made in his own family. Indeed, this is the case through all the Lowlands of Scotland. Flax is reared by every husbandman; and being dressed at home, is spun by the females of his family into thread for linen; this is woven by country weavers, of whom there is a great number through all the Low Country, and afterwards bleached or whitened by the good-wife and her servants; so that the whole is made fit for use at a very small expence. They likewise wash, card, spin, and weave their wool into tartan for plaids, kerfies, and coarse russet-cloth, for common wearing, besides great part of it which is knit into caps, stockings, and mitts. Plaids, made of the finest worsted, are worn either plain or variegated, as veils, by women of the lower, and even of the middle rank; nay, some years ago, ladies of fashion wore silken plaids with an undress: this

Perth. this is a loose piece of drapery, gathered about the head, shoulders, and waist, on which it is crossed, so as to leave the hands at liberty, and produces a very good effect to the eye of the spectator. The Lowlanders of Perthshire are civilized, hospitable, and industrious: the commerce of the country consists chiefly in corn, linen, and black cattle: there are, moreover, some merchants who trade to foreign countries.—For an account of the different divisions of this county above-mentioned, see the articles as they occur in the order of the alphabet.

PERTH Proper, stretching 20 miles in length, and at some places 15 in breadth, is bounded on the north east, by the Carse of Gowrie; on the east, by Angus; on the west, by Strathern; on the north, by Athol; and on the south, by the Frith of Tay. This is likewise a fruitful country, populous and well cultivated, abounding with gentlemen who possess opulent estates; with farmers who understand agriculture; and with manufacturers who turn their industry to great account. North-eastward from Perth to Brechin lies the vale of Strathmore, one of the most fertile districts in Scotland, which gives the title of *Earl* to the noble family of Lyon.

PERTH, the capital of the county of that name, is an agreeable, populous town, situated 20 miles within land, on the south bank of the river Tay. It was otherwise called *St Johnston's*, from a church dedicated to St John, as the patron of the place. It is a royal borough, second in dignity to the metropolis, the seat of a large presbytery, and gave the title of *Earl* to the family of Drummond, which is now forfeited. James Drummond, 4th earl, was created duke of Perth by James II. for adhering to whose interests he was outlawed. His two grandsons were attainted in 1745. No less than 14 national councils have been held at Perth between 1201 and 1459. But the oldest was at Scone, A. D. 926. Perth, in the reign of Edward I. of England, was possessed by the English, who secured it with fortifications: but after an obstinate resistance, they were expelled by Robert Bruce. In the year 1715, the rebels made it a place of arms, and retired to it, after the battle of Dunblane; but they were in a little time dislodged by the duke of Argyle, and retreated northwards with the pretender. They possessed it also in 1745. The pretender was proclaimed king, new magistrates were appointed, and an attempt was made to fortify it. The town is populous and handsome; the streets are well paved, and tolerably clean at all times; and the houses, though not stately, make a very decent appearance. Both the streets and houses are, for the greater part, disposed in a regularity of plan, which proves them not to be of the most remote antiquity. It is indeed true, that the level situation, being singularly favourable to regularity, might, even from the first, give this an advantage over many of our old boroughs. Several streets run in a direction parallel with the river, as far as a right can bear this relation to a curve line, nearly between east and west: these are again intersected by others extending between north and south. It should seem that anciently particular streets were inhabited, each by a particular class of artisans. The names still preserved seem to indicate as much. The shop-keepers or merchants occupied one street; the hammermen a

second; and other crafts occupied, in the same manner, each a separate street. Many of the houses in that street called the *Water-Gate*, seem to be very old buildings. Towards the southern end of the *Water-Gate* stands the famous palace of the Gowrie family. 'The house, and the very room, where the attempt of the Gowries to seize or assassinate the king was supposed to have been made, is now converted into barracks for a train of artillery; but the back-stair, down which the Ruthvens were thrown, is pulled down. This strange event, however magnified or attested by contemporary writers, is made up of so many improbabilities, or circumstances for which no reason can be assigned, that Sir David Dalrymple, in republishing the account printed by authority, 1600, preparatory to his further observations on it, seems justified in absolutely discrediting a fact which passed for problematical with so many persons at the very time. Dr Robertson supposes it a plot of Elizabeth to get James into her power. Mr Cant having discussed the whole story of the conspiracy in his *Muse's Threnodie*, p. 185—261, concludes, "that as this would have been a very impolitic measure, the best way of accounting for it is by James's known hatred to the Puritans, and wish to get rid of two popular characters." The king had been seized and forced from his favourites by the father of the Ruthvens 12 years before (1582), and though he affected to forgive him, took the first opportunity to condemn and execute him as a traitor, 1584. Mr Camden was too good a courtier to speak with impartiality of any part of this weak monarch's conduct. Though the name of *Gowrie* was abolished, the title of *Ruthven* was revived in the person of Sir Thomas Ruthven of Freeland, whom Charles II. 1651, created Lord Ruthven: but the honour, on the death of his son David in 1704, devolved on Isabel surviving daughter of his second sister, who married Sir Francis Ruthven, and was succeeded, 1732, by his son James.

The castle of Perth stood near the red bridge, which terminated the narrow street called *Skinner gate*. At the end of the Castle-street another narrow street leads west to the Black-friars called *Couvre feu row*, where the curfew bell was. The kings of Scotland before James II. were crowned at Scone, and resided at Perth as the metropolis of the nation. James resided and was educated in the castle of Edinburgh, and was crowned there 1437. The parliaments and courts of justice were removed from Perth to Edinburgh, but Perth kept its priority till 22 James III. 1482.

The church in which John Knox harangued is still standing, and is now divided into three; named the *east*, the *middle*, and the *west* kirks. The east kirk was lately very handsomely modernised within. There is an old hospital, a considerable building, the founding of which is ascribed to James VI. The town-house shuts up the eastern end of the High-street. A monastery of Carthusians was here established by King James I. of Scotland, who lost his life on the very spot, by the treachery of Athol and his accomplices. The king was buried in a very stately monument in this place, which was called *monasterium ecclesie carthusie*, one of the most magnificent buildings in the kingdom, which with the rest was destroyed by the populace. James VI. created George Hay commendatary

Perth.

Gough's
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Perth.

tor of the Carthusian priory, giving him all its emoluments, with a vote and seat in parliament; but these not being sufficient to support the title, he surrendered it back to the king. The only remains of this magnificent structure is to be seen in the carved stones with which the south-east porch of St John's church is built, now greatly decayed. The king's garment full of stabs was preserved here after the reformation.

The town was anciently provided with a stone bridge over the river, which an inundation swept away; but a new and very fine one has lately been built, the most beautiful structure of the kind in North Britain, and was designed and executed by Mr Smeaton. Its length is 900 feet; the breadth (the only blemish) 22 within the parapets. The piers are founded 10 feet beneath the bed of the river, upon oaken and beechen piles, and the stones laid in puzzalane, and cramped with iron. There are nine arches, of which the centre is 75 feet in diameter. This noble work opens a communication with all the different great roads of the kingdom, and was completed at the expence of 26,000*l*. Of this the commissioners of forfeited estates, by his majesty's permission, gave 11,000*l*. Perth 2000*l*. private subscribers 4756*l*. the royal boroughs 500*l*. But still this great work would have met with a check for want of money, had not the earl of Kinnoul, with his characteristic public spirit, advanced the remaining sum, and taken the security of the tolls, with the hazard only to himself. The whole expence has now been defrayed, and the toll has ceased.

Heron's

Tower, 1792.

"The Tay (says a late traveller), over which this bridge is thrown, and on the southern bank of which the city of Perth stands, is truly a noble river. It rises in Braidalbin, on the frontiers of Lorne. Before it has advanced many miles from its source, its stream is considerably augmented by the accession of several small rills. Soon after, it diffuses its waters into a small lake called Loch Dochart; and indeed the river itself there bears rather the name of the Dochart. Continuing its course from Loch Dochart, it soon again expands into another lake. Out of this it proceeds to Killin, still bearing, if I remember right, the name of the Dochart. Here it meets with another river which flows hither by a more north-easterly course. The waters are diffused into the famous Loch Tay, 16 miles in length. Issuing from this spacious lake at Kenmore, the Tay is soon after increased by the accession of the Lyon. It proceeds onward in an eastern direction through Athol, receiving as it advances all the waters in the country, till at Logierait it is joined by the large river of Tummel. Here it bends to the south, and advancing about 8 miles reaches Dunkeld; whence taking a more northern direction, it continues its course towards Perth; being as it advances still augmented by the accession of various tributary streams, the most considerable of which is the Almond. At Perth it turns to the south-east, and receiving as it proceeds the waters of the Erne, passes by Abernethy, once the capital of the Pictish kingdom. Soon after this, it expands itself to the breadth of three miles. Contracting its breadth, as it approaches Dundee, it there opens into the German ocean.

"Such is the noble river; on the southern bank of which, where it has increased into a vast body of water, and not a great many miles above where it dis-

charges itself into the ocean, Perth is advantageously situated. A person acquainted with the general character of great rivers, and with their influence in determining the aspect and the fertility of the districts thro' which they pass, might readily, without farther knowledge of the local circumstances than what is conveyed in this account of the course of the Tay, and of the situation of Perth upon it, conclude the city to stand amid delightful scenery, and to enjoy most of the advantages which natural circumstances afford, for the promotion of trade and industry."

This town has but one parish, which has two churches, besides meetings for separatists, who are very numerous. One church, which belonged to a monastery, is very ancient: not a vestige of the last is now to be seen; for the disciples of Knox made a general desolation of every edifice that had given shelter to the worshippers of the church of Rome: it being one of his maxims, to pull down the nests, and then the rooks would fly away.

The flourishing state of Perth is owing to two accidents: the first, that of numbers of Cromwell's wounded officers and soldiers choosing to reside here, after he left the kingdom, who introduced a spirit of industry among the people; the other cause was the long continuance of the earl of Marr's army here in 1715, which occasioned vast sums of money being spent in the place. But this town, as well as all Scotland, dates its prosperity from the year 1745; the government of this part of Great Britain having never been settled till a little after that time.

That this town does not owe its origin to William I. 1210, as Boethius says, is evident from its being mentioned as a considerable place in the foundation charter of Holyroodhouse by David I. 1128.

The trade of Perth is considerable. It exports annually 150,000*l*. worth of linen, from 24,000 to 30,000 bolls of wheat and barley to London and Edinburgh, and a very large quantity of cured salmon. That fish is taken there in vast abundance; 3000 have been caught in one morning; weighing, one with another, 16 pounds; the whole capture 48,000 pounds. The fishery begins on St Andrew's day, and ends August 26th old style. The rents of the fisheries amount to considerably upwards of 3000*l*. per annum. Smeits come up this river in May and June. See PEARLS. W. Long. 3. 27. N. Lat. 56. 22.

PERTH Ambly. See New JERSEY.

PERTINAX, was an illustrious Roman emperor after the death of Commodus. He was descended of a mean family; and like his father, who was either a slave or the son of a manumitted slave, he for some time followed the employment of drying wood and making charcoal. His poverty did not, however, prevent him from receiving a liberal education. For some time he was employed in teaching a number of pupils the Greek and the Roman languages in Etruria. He left this laborious profession and became a soldier, and by his valour and intrepidity gradually rose to offices of the highest trust in the army, and was made consul by M. Aurelius for his services. He was afterwards entrusted with the government of Mœsia, and at length he preceded over the city of Rome as governor. When Commodus was murdered, Pertinax was universally chosen to succeed to the imperial dignity;

Perth,

Pertinax

Pertinax. nity; and his refusal, on the plea of old age and increasing infirmities, did not prevent his being saluted emperor and Augustus. He complied with reluctance; but his mildness, his economy, and popularity, convinced the senate and the people of the prudence and the justice of their choice. He forbade his name to be inscribed on such places or statues as were part of the imperial domains, and asserted that they belonged not to him but to the public. He melted all the silver statues which had been raised to his predecessor, and he exposed to sale all his concubines, horses, arms, and all the instruments of his pleasure and extravagance. With the money raised from these relics he enriched the empire, and was enabled to abolish all the taxes which Commodus had laid on the rivers, ports, and highways, through the empire. These patriotic actions gained him the affection of the worthiest and most discerning of his subjects; but the extravagant, luxurious, and vicious, raised their clamours against him; and when the emperor attempted to introduce among the pretorian guards such discipline as was absolutely necessary to preserve the peace and tranquillity of Rome, the flames of rebellion were kindled, and the minds of the soldiers totally alienated. Pertinax was apprized of their mutinying, but he refused to fly at the hour of danger. He scorned the advice of such of his friends as wished him to withdraw from the impending storm; and he unexpectedly appeared before the seditious troops, and without fear or concern boldly asked them, whether they who were bound by duty to defend the person of their prince and emperor, were come to betray him and to shed his blood? His undaunted courage and intrepidity would have had the desired effect, and the soldiers had begun to retire, when one of the most seditious of them advanced and darted his javelin at the emperor's breast, exclaiming, *The soldiers send you this.* The rest instantly followed the example; and Pertinax, muffling up his head, and calling upon Jupiter to avenge his death, remained unmoved, and was immediately dispatched. His head was cut off and carried upon the point of a spear in triumph to the camp. This abominable murder happened in the 103d year of the Christian era.

It was no sooner known that Pertinax had been murdered, than the enraged populace flocked from all quarters of the city; and uttering dreadful menaces against the authors of his death, ran up and down the streets in quest of them. The senators were no less concerned for his death than the people; the more, because they were now convinced, that the soldiers would suffer none to reign but tyrants. However, as they had more to lose than the common people, they did not offer to revenge his death; but either shut themselves up in their own houses, or in those of the soldiers of their acquaintance, thinking themselves there most safe. Such was the unfortunate and much lamented end of Publius Helvius Pertinax, after he had lived 66 years 7 months and 26 or 28 days; and reigned, according to Dio Cassius, 87 days, that is, from the 1st of January to the 28th of March. His body, together with his head, was interred with great pomp by Didius Julianus, his successor, in the burying place of his wife's family. The emperor Septimius Severus, with the title of emperor, assumed the name of Pertinax, which he knew would above any thing

else recommend him to the army in Illyricum, and to the Roman people. He punished with great severity all those who had been accessory to his death, disbanded the pretorian guards, honoured his memory with a most magnificent funeral, at which was carried the effigies of the deceased prince, pronounced his panegyric, and caused him to be ranked in the number of the gods, appointing the son chief priest to his father. The day of his accession to the empire was yearly celebrated with the Circensian games; and his birthday, for many years after, with other sports. He performed great things, says Herodian, during his short administration, and would have restored the empire to its former lustre, had he been indulged with a longer reign.

PERTINENT OF LANDS, in Scots law. See **LAW**, N^o clxviii. 6. p. 670.

PERU, a country of South America, is bounded on the north by Popayan, on the east by Amazonia, on the south by Chili, and on the west by the Pacific ocean; extending from 1° 40' north to 26° 10' south latitude, and between 56° and 81° west longitude from Greenwich; being about 1800 miles in length, but its greatest breadth does not much exceed 390.

This country was discovered by the Spaniards; and the first intelligence they had of it was on the following occasion. Nunez de Balboa having been raised to the government of the small colony at Santa Maria in Darien by the suffrages of his companions, was very desirous of having that authority confirmed by the court of Spain. For this purpose he endeavoured to recommend himself to the Spanish ministry by some important service; that is, by extorting from the Indians as much gold and silver as he could. He therefore made frequent inroads into the adjacent country, subdued several of the caciques or petty princes, and collected a considerable quantity of gold. In one of these expeditions, the Spaniards contended so violently about the division of some gold which they had taken, that they were on the point of coming to blows with one another. A young cacique who was present, astonished at such contention about a thing of which he knew not the use, tumbled the gold out of the balance with indignation, and turning to the Spaniards, told them, that since they valued gold so very highly, he would conduct them to a country where the most common utensils were made of that metal. The Spaniards eagerly caught at this hint; and upon further questioning the cacique, were informed, that at the distance of six days journey, towards the south, from the place where they were at that time, they should discover another ocean, near which this desirable country was situated; but if they intended to attack that powerful state, they must assemble a much greater number of forces than had hitherto appeared on the continent.

Balboa was transported at the news. He immediately concluded, that the ocean mentioned by the cacique was that which Columbus had so long sought for in vain, and that the rich territory described to him must be part of the East Indies. He was therefore impatient till he should arrive at that happy country, in comparison with the discovery of which all former exploits almost vanished into nothing. In order therefore to procure a force sufficient to ensure success

Pertinent,
Peru.

How discovered by the Spaniards.

Peru.

in his enterprise, he first secured the friendship of the neighbouring caciques, and then dispatched some of his officers to Hispaniola, with a large quantity of gold as a proof of his past success, and an earnest of what he expected. By this means he secured the friendship of the governor, and procured a considerable reinforcement. But though he now imagined himself sufficiently strong to attempt the discovery, there were still prodigious difficulties to be surmounted. The isthmus of Darien, though not above 60 miles in breadth, has a chain of lofty mountains running through its whole extent. Being situated between two vast oceans, the Atlantic and Pacific, the climate is excessively moist, inasmuch that it rains for two-thirds of the year. In consequence of this the valleys are marshy, and so frequently overflowed, that the inhabitants find it necessary in some places to build their houses upon trees, in order to be elevated at some distance from the damp soil, and the odious reptiles engendered in the waters. There are also many large rivers very difficult to be crossed; and as the country at that time was only inhabited by a few wandering savages, the enterprise of Balboa was looked upon as the most difficult that had been undertaken by any Spanish adventurer.

On this arduous task Balboa set out on the 1st day of September 1513, about the time that the periodical rains began to abate. He had only 190 Spaniards along with him; but all of them were hardy veterans, inured to the climate of America, and very much attached to their leader. A thousand Indians attended in order to carry their provisions and other necessaries; and they had along with them some of those fierce dogs so terrible to the natives of America.

Balboa proceeded by sea, and without difficulty, to the territories of a cacique whose friendship he had gained; but as soon as he began to advance into the interior parts of the country, he met with all the difficulties above-mentioned. Some of the caciques also, at his approach, fled with all their people to the mountains, carrying off or destroying whatever could afford subsistence to an army. Others collected their force in order to oppose him: however, Balboa continued unmoved in spite of all difficulties; and at last, after a most painful journey of 25 days, he arrived at the South Sea; when, with the most extravagant transports of joy, he went into it up to the middle, and took possession of the ocean in his master's name, vowing to defend it against all the enemies of Spain.

That part of the South Sea which Balboa now discovered, he called the *Gulf of St Michael*; which name it still retains, and is situated to the east of Panama. From some of the neighbouring caciques he extorted provisions and gold by force; others sent him presents voluntarily; and he had the satisfaction to hear, that the adjacent coasts abounded with pearl oysters. The inhabitants were also unanimous in declaring, that there was to the southward a very rich and populous country, where the people had tame animals, which they endeavoured to describe to him, meaning the Peruvian sheep. But, however impatient he might be to visit this empire, he considered it as highly improper to venture farther with a handful of men exposed to fatigue and disease. He therefore led back his followers to Santa Maria, in order to refresh them

after their fatigues; and from thence he sent an account to the court of Spain of the important discovery he had made, demanding a reinforcement of 1000 men, in order to conquer the country he had newly discovered. But here his hopes were all blasted at once. The king indeed determined to prosecute the discovery, but refused to continue Balboa in his government, appointing Pedrarias Davila to supersede him, and giving him the command of 15 stout vessels, with 1200 soldiers, to ensure his success.

Balboa, though much mortified by his disgrace, submitted to the king's pleasure without repining. It was not long, however, before he met with an additional misfortune; the new governor tried him for some pretended irregularities committed before his arrival, and fined him of almost all he was worth. In the mean time the Spaniards, paying no regard to the treaties concluded by Balboa with the Indians, plundered and destroyed all indiscriminately, inasmuch that the whole country, from the gulph of Darien to the lake Nicaragua, was desolated. The new comers had also arrived at the most unlucky time of the year, namely, about the middle of the wet season, when the excessive rains produced the most violent and fatal diseases. To this was joined an extreme scarcity of provisions; so that in the space of a month above 600 Spaniards perished in the utmost misery.

Balboa failed not to send violent remonstrances to Spain against the conduct of the new governor; and he, on the other hand, accused his antagonist of having deceived the king by false accounts of the country, and magnifying his own exploits beyond measure. At last the king, sensible of his error in superseding Balboa, appointed him adelantado, or lieutenant-governor of the countries on the South Sea, with very extensive privileges and authority; enjoining Pedrarias to support him in all his enterprises, and to consult with him in every thing which he himself undertook. It was impossible, however, to extinguish the envy of Pedrarias; and therefore, though a reconciliation took place in appearance, even so far, that Pedrarias agreed to give his daughter in marriage to Balboa, yet he soon after had him condemned and executed on pretence of disloyalty, and an intention to revolt from the king.

On the death of Balboa, the thoughts of conquering Peru were for a time laid aside; however, it still remained an object of desire to all the Spanish adventurers in America. Accordingly, several armaments were fitted out with a design to explore and take possession of the countries to the east of Panama; but, either through the difficulties which attended the undertaking itself, or the bad conduct of the adventurers, all of them proved unsuccessful, until at last it became a general opinion, that Balboa's scheme had been entirely visionary.

Still, however, there were three persons settled at Panama, on whom the common opinion made so little impression, that they determined to go in quest of this country, looked upon to be chimerical by the generality of their neighbours. Their names were *Francisco Pizarro*, *Diego de Almagro*, and *Hernando Luque*. Pizarro and Almagro were soldiers of fortune, and Luque was an ecclesiastic, who acted both as priest and school-master at Panama. Their confederacy was authorised by

2
Difficulties
to be overcome.

3
Balboa first
gave a sight
of the
South Sea.

Peru.
He is de-
prived of
his com-
mand.

5
And put
to death.

6
A new ex-
pedition
on foot.

Peru. by Pedrarias governor of Panama; and each engaged to employ his whole fortune in the adventure. Pizarro, being the least wealthy of the three, engaged to take upon himself the greatest share of the fatigue and danger, and to command in person the armament which was to go first upon the discovery. Almagro offered to conduct the supplies of provisions and reinforcements of troops which might be necessary; and Luque was to remain at Panama, in order to negotiate with the governor, and to superintend whatever was carrying on for the general interest.

Peru. In 1524, Pizarro set sail from Panama with a single vessel of small burthen, and 112 men; and so little was he or his countrymen at that time acquainted with the climate of America, that the most improper season of the whole year was chosen for his departure; the periodical winds, which were then set in, being directly opposite to the course which he proposed to steer. The consequence of this was, that after beating about for 70 days, with much danger and fatigue, he had advanced scarce as far to the south-east as a skilful navigator will now make in three days. He touched at several places of Terra Firma; but finding that country exceedingly inhospitable and unhealthy, he was obliged to retire to Chuchama, opposite to the Pearl Islands, where he hoped to receive some reinforcements from Panama. Here he was found by Almagro, who had set out in quest of him with a reinforcement of 70 men, and had suffered distresses very much resembling those of Pizarro himself. In particular, he had lost an eye in a combat with the Indians. However, he had advanced as far as the river of St Juan in the province of Popayan, where the country showing a better aspect, and the inhabitants more friendly, our projectors again began to indulge themselves in hopes, and determined by no means to abandon their scheme.

Almagro returned to Panama, in hopes of recruiting their shattered troops. But the bad accounts of the service gave his countrymen such an unfavourable idea of it, that Almagro could levy no more than 80 men, and these with great difficulty. Slender as this reinforcement was, however, the adventurers did not hesitate at renewing their enterprise. The disasters and disappointments they met with in this new attempt, were scarce inferior to those they had already experienced, when part of the armament at last reached the bay of St Matthew on the coast of Quito, and landed at Tacamez, to the south of the river of Emeralds, where they met with a more fertile and campaign country than any they had yet seen; the natives also were more civilized, and clothed in garments of cotton or woollen stuff, adorned with trinkets of gold and silver. But notwithstanding these favourable appearances, Pizarro did not think fit to attack such a powerful empire with an handful of soldiers already exhausted; and therefore retired to a small island called *Gallo*, with part of the troops; from whence he dispatched Almagro to Panama, in hopes of obtaining a reinforcement.

The reception which Almagro met with was by no means agreeable. Some of the adventurers had informed their friends of the many dangers and losses which they had sustained; which not only disheartened people from engaging in the service, but weighed so much with Pedro de los Rios, the successor of Pedra-

rias, that he prohibited the raising of new recruits, and even dispatched a vessel to bring home Pizarro and his companions from the island of Gallo. Almagro and Luque, though much mortified with this disappointment, privately advised Pizarro not to relinquish an enterprise on which they had built all their hopes. He therefore positively refused to obey the orders of the governor, and employed all his address in persuading his men not to abandon him. But the calamities to which they had been exposed had such an effect upon them, that when he drew a line upon the sand with his sword, telling such as wished to return that they might pass over it, only 13 had resolution to remain with him.

Pizarro with his little troop now fixed their residence on the island of Gorgona, which they considered as a safer retreat than Gallo, as being farther removed from the coast and uninhabited, so that they might with the greater security wait for supplies. Here they continued five months in the most unwholesome climate imaginable, and at last had come to a resolution of committing themselves to sea on a float, when a vessel arrived from Panama to their relief. This was the effect of the continued solicitations of Almagro and Luque; who, though they could not prevail upon the governor to favour the undertaking, had succeeded so far as to induce him to send a small vessel to the relief of Pizarro and his unfortunate associates. However, the more effectually to show his disapprobation of Pizarro's scheme, the governor refused to allow one landman to go on board of the ship which he sent.—The hopes of the adventurers, however, were now again revived, and Pizarro easily induced them to resume their scheme. Instead of returning to Panama, therefore, they sailed to the south east, and in 20 days after the discovery of Gorgona they discovered the coast of Peru. Having touched at some places of less note, they at length arrived at Tumbez, remarkable for its stately temple, and a palace of the Incas or sovereigns of the country. Here they found that what had been told them concerning the riches of the country was true; not only ornaments and sacred vessels being made of gold and silver, but even such as were for common use. Yet to attempt the conquest of this opulent empire with their slender force, would have been madness; they contented themselves therefore with viewing it, procuring two of the beasts of burthen called *Llamas*, to which they gave the name of sheep, some vessels of gold and silver, and two young men, whom they proposed to instruct in the Castilian language. With these Pizarro arrived at Panama in the year 1527, near three years after he had set out from that place in his expedition.

The empire of Peru thus discovered, is said to have been originally possessed by independent tribes, justly reckoned among the most savage even in America; living more like wild beasts than men. For several ages they lived in this manner, when suddenly there appeared on the banks of a lake called *Titiaca*, a man and woman of majestic form, and clothed in decent garments. They declared themselves to be the children of the sun, sent by their beneficent parent to instruct and reclaim mankind.

The names of these two extraordinary personages were *Manco Capac* and *Mama Ocla*. At their persuasion,

Peru. Pizarro abandoned by all his men but thirteen.

² Goes on with his scheme at all adventures.

¹⁹ History of Peru.

Peru.

son, several of the dispersed savages united, and, receiving their commands as heavenly injunctions, followed them to Cuzco, where they settled, and began to lay the foundations of a city. Manco Capac instructed the men in agriculture, and other useful arts; while Mama Ocla taught the women to spin and weave; after which Manco turned his attention towards the introducing of proper laws and regulations into his new state.

Thus, according to the Indian tradition, was founded the empire of the Incas, or lords of Peru. At first its extent was small, the territory of Manco Capac reaching not above eight leagues from Cuzco his capital. Within these narrow limits, however, he exercised the most perfect despotism, and the same was maintained by his successors, all of whom were not only obeyed as monarchs, but revered as deities. Their blood was held to be sacred, and, by prohibiting intermarriages with the people, was never contaminated by mixing with that of any other race. The family, thus separated from the rest of the nation, was distinguished by peculiarities in dress and ornaments, which it was unlawful for others to assume. Among the Peruvians, however, it is said, that this high degree of veneration was made use of by the monarchs only to promote the good of their subjects. If we may believe the accounts given by their countrymen, the Peruvian monarchs extended their empire not with a view to increase their own power and wealth, but from a desire of diffusing the blessings of civilization, and the knowledge of the arts which they possessed, among the barbarous people whom they reduced, and, during a succession of 12 monarchs, not one deviated from this character.

The Peruvians were taught by Manco to adore the Creator of heaven and earth, whom they denominated *Paca Camac*, that intelligence which animated the world. They seldom built temples or offered sacrifices to him, but worshipped him in their hearts. One temple, however, dedicated to *The unknown God*, the Spaniards found at their arrival, erected in a valley, thence named *the valley of Paca Camac*. The sacrifices instituted in honour of the sun consisted chiefly of lambs; besides which they offered all sorts of cattle, fowls, and corn, and even burnt their finest cloths on the altar by way of incense. They had also drink offerings made of maize or Indian corn, steeped in water. Nor were those oblations the only acts of adoration in general use among them. When they first drank after their meals, they dipped the tip of their finger into the cup, and lifting up their eyes with great devotion, gave the sun thanks for their liquor, before they presumed to take a draught of it.

Besides the worship of the sun, they paid some kind of veneration to the images of several animals and vegetables that had a place in their temples. Those were generally the images brought from the conquered nations, where the people worshipped all sorts of creatures, animate or inanimate; it being the custom, when a province was subdued to remove all their idols to the temple of the sun at Cuzco.

Exclusive of the solemnities at every full moon, four grand festivals were celebrated annually. The first of those, called *Raymi*, was held in the month of June, immediately after the summer solstice, and was kept

not only in honour of the sun, but of their first Inca, Manco Capac, and Coya Mama Ocla, his wife and sister, whom the Incas considered as their first parents, descended immediately from the sun, and sent by him into the world to reform and punish mankind. At this festival, all the viceroys, generals, governors, and nobility, were assembled at the capital city of Cuzco; and the emperor, or Inca, officiated in person as high priest; though on other occasions the sacerdotal function was discharged by the regular pontiff, who was usually either the uncle or brother of the Inca.

The morning of the festival being come, the Inca, accompanied by his near relations, drawn up in order according to their seniority, went barefoot in procession, at break of day, to the market-place, where they remained looking attentively towards the east in expectation of the rising sun. The lumina y no sooner appeared, than they fell prostrate on their faces in the most profound veneration, and universally acknowledged it to be their god and father.

The vassal princes, and nobility, that were not of the blood royal, assembled in another square, and performed the like ceremony. Out of a large flock of sheep the priests then chose a black lamb, which they offered in sacrifice, first turning its head towards the east. From the entrails of the victim, on this occasion, they superstitiously drew prognostics relating to peace and war, and other public events.

That the Peruvians believed in the immortality of the soul, appears from the practice of the Incas, who constantly inculcated to the people, that on leaving this world, they should enter into a state of happiness provided for them by their god and father the sun.

Before the arrival of the Spaniards in America, the Peruvians were acquainted with some points of astronomy. They had observed the various motions of the planet Venus, and the different phases of the moon. The common people divided the year only by the seasons; but the Incas, who had discovered the annual revolution of the sun, marked out the summer and winter solstices by high towers, which they erected on the east and west of the city of Cuzco. When the sun came to rise directly opposite to four of those towers, on the east side of the city, and to set against those of the west, it was then the summer solstice; and in like manner, when it rose and set against the other towers, it was the winter solstice. They had also erected marble pillars in the great court before the temple of the sun, by which they observed the equinoxes. This observation was made under the equator, when the sun being directly vertical, the pillars cast no shade. At those times they crowned the pillars with garlands of flowers and odorous herbs, and celebrating a festival, offered to their adored luminary rich presents of gold and precious stones.

They distinguished the months by the moon, and their weeks were called quarters of the moon; but the days of the week they marked only by the ordinal numbers, as first, second, &c. They were astonished at the eclipses of the sun and moon. When the former hid his face, they concluded it was on account of their sins, imagining that this phenome-

Peru.

Carver's
Modern
General
Traveller.

II
Religion of
the Peruvians.

12
They were
acquainted
with astro-
nomy be-
fore the ar-
rival of the
Spaniards.

Peru. non portended famine, war, and pestilence, or some other terrible calamity. In a similar state of the moon, they apprehended that she was sick, and when totally obscured, that she was dying. At this alarming crisis they sounded their trumpets, and endeavoured by every kind of noise to rouse the lunar planet from her supposed lethargy; teaching their children to cry out, and call upon *mana quilla*, or "mother moon," that she would not die and leave them to perish.

They made no predictions from any of the stars, but considered dreams, and the entrails of beasts which they offered in sacrifice, as instructive objects of divination. When they saw the sun set, they imagined that he plunged into the ocean, to appear next morning in the east.

13 They had
ea hers of
morality;
Among a people wholly void of letters, the speculative essays of the understanding must have been very rude and imperfect. They had, however, among them amentas, or philosophers, who delivered moral precepts, and likewise cultivated poetry. Comedies and tragedies composed by those bards were acted on their festivals before the king and the royal family, the performers being the great men of the court, and the principal officers of the army. The amentas also composed songs and ballads; but if we may judge from the rudeness of the music with which they are said to have been accompanied, they were far from being agreeable to a polished ear.

14 And were
not unac-
quainted
with paint-
ing and
sculpture.
That the Peruvians were not unacquainted with painting and statuary, appears from the furniture and ornaments of their temples and palaces; but in all the implements of mechanic arts they were extremely deficient. Though many goldsmiths were constantly employed, they had never invented an anvil of any metal, but in its stead made use of a hard stone. They beat their plate with round pieces of copper in place of hammers; neither had they any files or graving tools. Instead of bellows for melting their metals, they used copper pipes, or a yard long, almost of the form of a trumpet. Having no tongs to take their heated metal out of the fire, they made use of a stick or copper bar. Their carpenters had no other tools than hatchets made of copper or flint; nor had they learned the use of iron; though the country affords mines of that metal. Instead of nails, they fastened their timber with cords or the tough twigs of trees. A thorn, or a small bone, served them for a needle; and instead of thread, the sinews of animals, or the fibres of some plant. Their knives were made of flint or copper.

15 Progress of
the Spa-
niards faci-
tated by a
civil war
among the
natives;
When the Spaniards first visited this country, they found it agitated by a civil war. Huana Capac, the 12th monarch from the founder of the state, was seated on the throne; who is represented as a prince no less conspicuous for his abilities in war than for his pacific virtues. By him the kingdom of Quito was subdued, which almost doubled the extent of the dominions and power of the Peruvian empire. Notwithstanding the ancient and fundamental law against polluting the blood of the Inca with any foreign alliance, Huana married the daughter of the conquered monarch, by whom he had a son named *Atabalipa*, commonly written *Atabalipa*, to whom, at his death in 1529, he left the kingdom of Quito, bestowing the rest of his dominions upon Huascar his eldest son by a

mother of the royal race. This produced a civil war, in which Atabalipa proved victorious, and afterwards attempted to secure himself on the throne by putting to death all the descendants of Manco Capac, styled *the children of the Sun*, whom he could seize either by force or stratagem; however, from a political motive, he spared the life of his rival Huascar, who had the misfortune to be taken prisoner in an engagement, that, by issuing out orders in his name, he might more easily establish his own authority, and cover the illegality of his birth.

This contest had so much engaged the attention of the Peruvians, that they never once attempted to check the progress of the Spaniards. It was some time, however, before Pizarro was informed of this contest, so much in his favour. The first intelligence which he received of it was a message from Huascar, asking his assistance against Atabalipa, whom he represented as a rebel and an usurper. Pizarro perceived the importance of the intelligence, and therefore determined to push forward, while intestine discord put it out of the power of the Peruvians to attack him with their whole force. Being obliged to divide his troops, in order to leave a garrison in St Michael, which might serve for a place of retreat in case of a disaster, he began his march with only 62 horsemen and 102 foot-soldiers, 20 of whom were armed with cross-bows, and only three with muskets. He directed his course towards Caxamalca, a small town at the distance of 12 days march from St Michael, where Atabalipa was encamped with a considerable body of troops. Before he had proceeded far, an officer dispatched by the Inca met him with a valuable present from that prince, accompanied with a proffer of his alliance, and his assurances of a friendly reception at Caxamalca. Pizarro, according to the usual artifice of his countrymen in America, pretended to come as the ambassador of a very powerful monarch, and declared that he was now advancing with intention to offer Atabalipa his aid against those enemies who disputed his title to the throne.

16 And by
their igno-
rance of the
motives of
the Spa-
niards.
As the object of the Spaniards in entering their country was altogether incomprehensible to the Peruvians, they had formed various conjectures concerning it, without being able to decide whether they should consider their new guests as beings of a superior nature, who had visited them from some beneficent motive, or as formidable avengers of their crimes, and enemies to their repose and liberty. The continual professions of the Spaniards, that they came to enlighten them with the knowledge of truth, and lead them in the way of happiness, favoured the former opinion; the outrages which they committed, their rapaciousness and cruelty, were awful confirmations of the latter. While in this state of uncertainty, Pizarro's declaration of his pacific intentions so far removed all the Inca's fears, that he determined to give him a friendly reception. In consequence of this resolution, the Spaniards were allowed to march in tranquillity across the sandy desert between St Michael and Motupè, where the most feeble effort of an enemy, added to the unavoidable distresses which they suffered in passing through that comfortless region, must have proved fatal to them. From Motupè they advanced towards the mountains which encompass the low country of Peru, and pass-

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ed through a defile so narrow and inaccessible, that a few men might have defended it against a numerous army. But here likewise, from the same inconsiderate credulity of the Inca, the Spaniards met with no opposition, and took quiet possession of a fort erected for the security of that important station. As they now approached near to Caxamalca, Atabalipa renewed his professions of friendship; and, as an evidence of his sincerity, sent them presents of greater value than the former.

On entering Caxamalca, Pizarro took possession of a large court, on one side of which was a house which the Spanish historians call a palace of the Inca, and on the other a temple of the sun, the whole surrounded with a strong rampart or wall of earth. When he had posted his troops in this advantage us station, he dispatched Hernando Soto, and his brother Ferdinand, to the camp of Atabalipa, which was about a league distant from the town. He instructed them to confirm the declaration which he had formerly made of his pacific disposition, and to desire an interview with the Inca, that he might explain more fully the intention of the Spaniards in visiting his country. They were treated with all the respectful hospitality usual among the Peruvians in the reception of their most cordial friends, and Atabalipa promised to visit the Spanish commander next day in his quarters. The decent deportment of the Peruvian monarch, the order of his court, and the reverence with which his subjects approached his person and obeyed his commands, astonished those Spaniards, who had never met in America with any thing more dignified than the petty cacique of a barbarous tribe. But their eyes were still more powerfully attracted by the vast profusion of wealth which they observed in the Inca's camp. The rich ornaments worn by him and his attendants, the vessels of gold and silver in which the repast offered to them was served up, the multitude of utensils of every kind formed of those precious metals, opened prospects far exceeding any idea of opulence that a European of the 16th century could form.

On their return to Caxamalca, while their minds were yet warm with admiration and desire of the wealth which they had beheld, they gave such a description of it to their countrymen, as confirmed Pizarro in a resolution which he had already taken. From his own observation of American manners during his long service in the New World, as well as from the advantages which Cortes had derived from seizing Montezuma, he knew of what consequence it was to have the Inca in his power. For this purpose, he formed a plan as daring as it was perfidious. Notwithstanding the character he had assumed of an ambassador from a powerful monarch, who courted an alliance with the Inca, and in violation of the repeated offers which he had made to him of his own friendship and assistance, he determined to avail himself of the unsuspicious simplicity with which Atabalipa relied on his professions, and to seize his person during the interview to which he had invited him. He prepared for the execution of his scheme with the same deliberate arrangement, and with as little compunction, as if it had reflected no disgrace on himself or his country. He divided his cavalry into three small squadrons, under the command of his brothers Ferdi-

nand, Soto, and Benalcazar; his infantry was formed into one body, except 20 of most tried courage, whom he kept near his own person to support him in the dangerous service which he reserved for himself; the artillery, consisting of two field-pieces, and the cross-bow men, were placed opposite to the avenue by which Atabalipa was to approach. All were commanded to keep within the square, and not to move until the signal for action was given.

Early in the morning the Peruvian camp was all in motion. But as Atabalipa was solicitous to appear with the greatest splendour and magnificence in his first interview with the strangers, the preparations for this were so tedious, that the day was far advanced before he began his march. Even then, lest the order of the procession should be deranged, he moved so slowly, that the Spaniards became impatient and apprehensive that some suspicion of their intention might be the cause of this delay. In order to remove this, Pizarro dispatched one of his officers with fresh assurances of his friendly disposition. At length the Inca approached. First of all appeared 400 men in an uniform dress, as harbingers to clear the way before him. He himself, sitting on a throne or couch, adorned with plumes of various colours, and almost covered with plates of gold and silver enriched with precious stones, was carried on the shoulders of his principal attendants. Behind him came some chief officers of his court, carried in the same manner. Several bands of singers and dancers accompanied this cavalcade: and the whole plain was covered with troops, amounting to more than 30,000 men.

As the Inca drew near the Spanish quarters, father Vincent Valverde, chaplain to the expedition, advanced with a crucifix in one hand, and a breviary in the other, and in a long discourse explained to him the doctrine of the creation, the fall of Adam, the incarnation, the sufferings and resurrection of Jesus Christ, the appointment of St Peter as God's viceroy on earth, the transmission of his apostolical power by succession to the popes, the donation made to the king of Castile by pope Alexander of all the regions in the New World. In consequence of all this, he required Atabalipa to embrace the Christian faith, to acknowledge the supreme jurisdiction of the pope, and to submit to the king of Castile as his lawful sovereign; promising, if he complied instantly with this requisition, that the Castilian monarch would protect his dominions, and permit him to continue in the exercise of his royal authority; but if he should impiously refuse to obey this summons, he denounced war against him in his master's name, and threatened him with the most dreadful effects of his vengeance.

This strange harangue, unfolding deep mysteries, and alluding to unknown facts, of which no power of eloquence could have conveyed at once a distinct idea to an American, was so lamely translated by an unskilful interpreter, little acquainted with the idiom of the Spanish tongue, and incapable of expressing himself with propriety in the language of the Inca, that its general tenor was altogether incomprehensible to Atabalipa. Some parts in it, of more obvious meaning, filled him with astonishment and indignation. His reply, however, was temperate. He began with observing, that he was lord of the dominions over which

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scheme of
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seize the
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he reigned by hereditary succession; and added, that he could not conceive how a foreign priest should pretend to dispose of territories which did not belong to him; that if such a preposterous grant had been made, he, who was the rightful possessor, refused to confirm it; that he had no inclination to renounce the religious institutions established by his ancestors; nor would he forsake the service of the sun, the immortal divinity whom he and his people revered, in order to worship the God of the Spaniards, who was subject to death; that with respect to other matters contained in his discourse, as he had never heard of them before, and did not now understand their meaning, he desired to know where he had learned things so extraordinary. "In this book," answered Valverde, reaching out to him his breviary. The Inca opened it eagerly; and turning over the leaves, lifted it to his ear: "This," says he, "is silent; it tells me nothing;" and threw it with disdain to the ground. The enraged monk, running towards his countrymen, cried out, "To arms, Christians, to arms; the word of God is insulted; avenge this profanation on those impious dogs."

Pizarro, who during this long conference had with difficulty restrained his soldiers, eager to seize the rich spoils of which they had now so near a view, immediately gave the signal of assault. At once the martial music struck up, the cannon and muskets began to fire, the horse sallied out fiercely to the charge, the infantry rushed on sword in hand. The Peruvians, astonished at the suddenness of an attack which they did not expect, and dismayed with the destructive effects of the fire-arms, and the irresistible impression of the cavalry, fled with universal consternation on every side, without attempting either to annoy the enemy or to defend themselves. Pizarro, at the head of his chosen band, advanced directly towards the Inca; and though his nobles crowded around him with officious zeal, and fell in numbers at his feet, while they vied one with another in sacrificing their own lives, that they might cover the sacred person of their sovereign, the Spaniards soon penetrated to the royal seat; and Pizarro seizing the Inca by the arm, dragged him to the ground, and carried him as a prisoner to his quarters. The fate of the monarch increased the precipitate flight of his followers. The Spaniards pursued them towards every quarter, and, with deliberate and unrelenting barbarity, continued to slaughter wretched fugitives, who never once offered at resistance. The carnage did not cease until the close of day. Above 2000 Peruvians were killed. Not a single Spaniard fell, nor was one wounded but Pizarro himself, whose hand was slightly hurt by one of his own soldiers, while struggling eagerly to lay hold on the Inca.

The plunder taken on this occasion was immense, but the Spaniards were still unsatisfied; which being observed by the Inca, he endeavoured to apply himself to their ruling passion, avarice, in order to obtain his liberty, and therefore offered such a ransom as astonished them, even after all they knew concerning the opulence of the country. The apartment in which he was confined was 12 feet in length and 16 in breadth; and all this space he engaged to fill with vessels of gold as high as he could reach. This proposal was eagerly caught by Pizarro, and a line was drawn upon the walls to mark the stipulated height.

Atabalipa, charmed with the thoughts of liberty, immediately set about performing his part of the agreement, and dispatched messengers into all parts of the empire, in order to collect the immense quantity of gold which he had promised; and though the unfortunate monarch was now in the hands of his enemies, such was the veneration which his subjects had for him, that his orders were obeyed with as great alacrity as though he had been at full liberty; while he, in the mean time, flattering himself with the hopes of being soon released, made no preparations for expelling the invaders from his dominions.

In a short time Pizarro received intelligence that Almagro was arrived at St Michael with a reinforcement equal to the force he had with him. This was a matter of great joy to the Spaniards, and no small vexation to Atabalipa, who now considered his kingdom as in danger of being totally over-run by these strangers, whose force he neither knew, nor the means they had of transporting themselves. For this reason he determined to put his brother Huascar to death, lest he should join the strangers against him. To this he was the rather inclined, as he had got information that the captive prince had been making applications to them, and had offered them a much larger sum than what was stipulated for the Inca's ransom; and in consequence of this determination the unfortunate prince lost his life.

In the mean time the Indians daily arrived at Caxamalca with vast quantities of treasure; the sight of which so much inflamed the Spaniards, that they insisted upon an immediate division: and this being complied with, there fell to the share of each horseman 8000 pesos, at that time not inferior to the value of as many pounds sterling in the present century, and half as much to each foot-soldier, Pizarro and his officers receiving shares proportionable to their dignity. A sixth part was reserved for the emperor, together with some vessels of curious workmanship as a present. In consequence of this immense acquisition of wealth, many of the Spaniards became clamorous for their discharge; which was readily granted by their general, as well knowing that the display of their riches would not fail to allure adventurers more hardy, though less opulent, to his standard.

After this division of the spoil, Atabalipa was very importunate with Pizarro in order to recover his liberty: but the Spaniard, with unparalleled treachery and cruelty, had now determined to put him to death. To this he was urged by Almagro's soldiers, who, though they had received an equal share with the rest, were still unsatisfied. The Inca's ransom had not been completed; and they were apprehensive, that whatever sums might afterwards be brought in, the troops of Pizarro would appropriate them to themselves as part of that ransom. They insisted with Pizarro, therefore, to put him to death, that all the adventurers might for the future be on an equal footing. Accounts were likewise received that troops were assembling in the remote provinces of the empire, which Pizarro suspected to be done by the Inca's orders. These accounts were heightened by one Philipillo an Indian interpreter, who had conceived a passion for one of the unhappy monarch's wives; and for that reason wished to have him put to death. Atabalipa himself,

20. ten, had the misfortune to hasten his own ruin by his conceiving a contemptuous notion of Pizarro, which he had not the precaution to conceal. He had, since they were first discovered by him, admired the European arts of reading and writing, and wished much to know whether he should regard it as a natural or acquired talent. In order to determine this, he desired one of the soldiers who guarded him to write the name of God upon the nail of his thumb. This he showed to several Spaniards successively, asking its meaning; and, to his surprise, they all returned the same answer. At length Pizarro entered; and, on presenting it to him, he blushed, and was obliged to own his ignorance; which inspired the Inca with the contemptuous notion of him above-mentioned.

21. In order, however, to give some show of justice to Atabalpa, accused and condemned, such a detestable action, and that he might be exempted from standing singly as the perpetrator, Pizarro resolved to accuse the Inca of some capital crime, and institute a court of judicature for the purpose of trying him. For this purpose, he appointed himself and Almagro, with two assistants, as judges, with full powers to acquit or condemn: an attorney-general was named to carry on the prosecution in the king's name; counsellors were chosen to assist the prisoner in his defence; and clerks were ordained to record the proceedings of court. Before this strange tribunal a charge was exhibited still more amazing. It consisted of various articles: that Atabalpa, though a bastard, had dispossessed the lawful owner of the throne, and usurped the regal power; that he had put his brother and lawful sovereign to death; that he was an idolater, and had not only permitted, but commanded the offering up of human sacrifices; that he had a great number of concubines; that since his imprisonment, he had wasted and enbezzed the royal treasures, which now belonged of right to the conquerors; and that he had excited his subjects to take up arms against the Spaniards. On these heads of accusation they proceeded to try the sovereign of a great empire, over whom they had no jurisdiction. To all these charges the Inca pleaded not guilty. With respect to the death of his brother, he alleged, that the Spaniards could take no cognizance of the fact. With regard to the taxes which he had levied, and the wars he had carried on, they were nothing to the Spaniards; and as to the conspiracy against the Spaniards, he utterly denied it. He called heaven and earth to witness the integrity of his conduct, and how faithfully he had performed his engagements, and the perfidy of his accusers. He desired to be sent over to Spain to take his trial before the emperor; but no regard was paid to his intreaties. He was condemned to be burnt alive; which cruel sentence was mitigated, as a great favour, to strangling; and the unhappy monarch was executed without mercy.

22. And strangled.

The death of the Inca was followed by a revolution in the Spanish affairs, who now became generally odious. Hateful cries were set up by his women as the funeral procession passed by their apartment; many offered to bury themselves alive with him; and on being hindered, strangled themselves out of grief and vexation. The whole town of Caxamalea was filled with lamentation, which quickly extended itself over the whole kingdom. Friends and enemies accused the

23. A general revolt of the Peruvians.

Spaniards of inhumanity and treachery. Loads of gold that were coming to Caxamalea by order of the deceased Inca were now stopped; and the loss of the treasure was the first unfortunate consequence which the Spaniards felt from their late iniquitous conduct. The two factions of Indians united against Pizarro; and many of the Spaniards not only exclaimed against the cruelty of the judges, but would even have mutinied, had not a sense of the impending danger kept them quiet. At Cuzco the friends of the emperor Huascar proclaimed Manco Capac the legitimate brother of the late Inca, determining to support him to the last against all the machinations of his enemies. Pizarro, in the mean time, set up Taparipa, the son of Atabalpa, causing him to be treated with all the honours due to an emperor. Immediately he set out for Cuzco, the gaining of which was absolutely necessary for his design. An army of Indians occupied the passes, and resolved to dispute his progress. The contest, however, was soon decided; the Spanish cavalry bore down every thing before them, and great numbers of Indians were slain. The conquerors gained a considerable booty; and Pizarro dispatched Almagro to reduce Cuzco, while he himself founded a new colony in the fruitful valley of Xauna; which, however, was not permanent, being afterwards removed to the place where Lima now stands.

While Pizarro was thus employed, another commander, named *Ferdinando Soto*, was detached with 60 horse to make the best of his way to Cuzco, and clear the road for the march of the remainder of the army. He was opposed by a formidable collection of Indians, who had fortified themselves in order to defend a pass against him: for which reason, fearing lest his strength might be unequal, he sent a message to Pizarro, desiring that the Inca might join him, thinking that his presence would awe the Peruvians, and prevent the further effusion of blood; but his expectations were frustrated by the death of the Inca, which happened about this time; so that there was now a necessity for having recourse to arms; for as the Spaniards set up no person in his room, the title of Manco Capac was universally acknowledged.

In the mean time, a new supply of soldiers arriving from Spain, Benalcazar, governor of St Michael, undertook an expedition against Quito, where, according to the report of the natives, Atabalpa had left the greatest part of his treasure. He accomplished his purpose with very great difficulty, having a country covered with rocks and mountains to pass, and being opposed by large bodies of the natives. But when he got possession of the city, to his extreme mortification, he found that the inhabitants had carried off all their gold and silver; for they being now acquainted with the ruling passion of the Spaniards, had taken care to disappoint it, by removing the treasures which they knew very well had been the cause of the expedition.

About the same time Alvarado governor of Guatimala, invaded the province of Chili. In this expedition his troops endured such hardships, and suffered so much from the cold among the Andes, that a fifth part of the men and all the horses died, and at the same time the rest were so much dispirited and emaciated, that they became quite unfit for service. What

was

was worst of all, when they had arrived at the end of their journey, they met with a body of Spaniards drawn up in hostile array to oppose them. These had been sent against him by Pizarro, who claimed Chili as part of his jurisdiction, and were now joined by Benalcázar, with the troops under his command. Alvarado, however, advanced boldly to the attack; but, on the interposition of some moderate men in each party, the difference was accommodated. Alvarado engaged to return to his government, upon his being paid 100,000 pesos to defray the expence of his armament. However, most of his followers remained in the country, and enlisted in the service of Pizarro.

In the meantime Ferdinand Pizarro, the brother of the general, had landed in Spain, where he produced such immense quantities of gold and silver as astonished the court, even after all they had seen of the wealth of their new-discovered territories. The general's authority was confirmed to him with new powers and privileges, and the addition of 70 leagues extending along the coast, to the southward of the territory granted in his former patent. Almagro had the title of *adelantado* or *governor* conferred upon him, with jurisdiction over 20 leagues of a country lying southward from the province allotted to Pizarro; he himself was made a knight of the order of St. Jago.

Of these transactions some accounts were received at Peru before the arrival of Ferdinand Pizarro himself; and no sooner did Almagro hear that he had obtained the royal grant of an independent government, than, pretending that Cuzco, the capital of all Peru, lay within his jurisdiction, he attempted to seize it. Pizarro was no less ready to oppose him; and a very dangerous civil war was about to take place, when the quarrel was made up, on condition that Almagro should attempt the conquest of Chili; and if he did not find there an establishment equivalent to his expectations, Pizarro should yield up to him part of Peru.

By this reconciliation Pizarro was left at liberty to settle the internal policy of his province, which, though little qualified for a legislator, he attempted, by dividing the country into various districts, appointing magistrates to preside in each, and establishing such regulations concerning the administration of justice, the royal revenue, &c. as occurred to him. The seat of government he removed from Cuzco to Lima, which he named *Ciudad de los Reyes*, and which name it still retains among the Spaniards in all legal and formal deeds. Its other name, *Lima*, is a corruption of *Rimac*, the name of the valley in which the city stands.

In the mean time Almagro had set out on his expedition to Chili; the event of which has been related under the article CHILI; and while he was thus employed, Pizarro encouraged some of his most distinguished officers to invade those provinces of the empire which had not yet been visited by the Spaniards. This he did with a view to keep them employed, and prevent tumults; but it was attended with very terrible consequences. No sooner did Manco Capac the Inca perceive the security of the Spaniards in thus dividing their forces, than he seized the opportunity of making one vigorous effort to redress the wrongs of himself and his countrymen, and expel the invaders, who had

tyrannized in such a cruel manner. Though strictly guarded by the Spaniards, he found means to communicate his intentions to the chief men of his nation, whom he joined in the year 1536, under pretence of celebrating a festival which he had obtained liberty from Pizarro to attend. Upon this the standard of war was immediately erected, and a most formidable army, according to the Spanish historians, of 200,000 men collected. Many Spaniards were massacred in their habitations, and several detachments entirely cut off; and while this vast army laid siege to Cuzco, another formidable body invested Lima, and kept the governor closely shut up. The greatest effort, however, was made against Cuzco, which was defended by Pizarro and his two brothers, with only 170 men. The siege lasted nine months; many of the Spaniards were killed; among whom was Juan Pizarro, the general's brother, and the best beloved of them all. The rest were reduced to the most desperate situation, when Almagro appeared suddenly in the neighbourhood of Cuzco. He had received such accounts of the insurrection in Peru, as would at any rate have determined him to return to the assistance of Pizarro; but besides this, he had now received the royal patent, creating him governor of Chili, and deemed it certain beyond all contradiction, that Cuzco lay within his jurisdiction; for which reason he hastened to prevent it from falling into the hands of the Peruvians. On his arrival his assistance was solicited by both parties. The Inca made many advantageous proposals; but at length despairing of obtaining any cordial union with a Spaniard, he attacked him in the night by surprise with a great body of chosen troops. But the Spanish valour and discipline prevailed against all the numbers of their enemies; and the Peruvians were repulsed with such slaughter, that a great part of the remainder dispersed, and Almagro advanced to the gates of Cuzco without opposition. Pizarro's brothers took measures to oppose his entrance; but prudence for the present restrained both parties from entering into a civil war while they were surrounded with enemies; and therefore each leader endeavoured to corrupt the followers of his antagonist. In this Almagro had the advantage; and to many of Pizarro's troops deserted in the night, that Almagro was encouraged to advance towards the city, where he surprised the sentinels; and invading the house where the two brothers were lodged, he compelled them, after an obstinate defence, to surrender at discretion; and Almagro's authority over Cuzco was immediately recognized as authentic.

In this fray only two or three persons were killed; but matters soon began to wear a more serious aspect. Francis Pizarro, having dispersed the Peruvian who invested Lima, and received considerable reinforcements from other provinces, ordered 500 men under the command of Alonso de Alvarado to march to Cuzco, in hopes of relieving his brothers; but they were not already cut off. They advanced to a small distance from the capital, before they knew that they had a more formidable enemy than the Incas to encounter. When they saw their countrymen drawn up on the banks of a river to oppose them, they were greatly surprised; however, Almagro, who valued rather to gain them than to fight, began with attempting to seduce their leader. Alvarado could not by any means be gained over;

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A dreadful
insurrection
of the Peruvians.

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They are
defeated,
and dispersed.

29

Civil war
between
Pizarro
and Almagro.

Peru.

over; but being inferior in military skill, Almagro attacked him by surprise, entirely defeated and dispersed his army, taking himself and some of his principal officers prisoners.

This victory seemed decisive; and Almagro was advised to make it so by putting to death Gonzalo and Ferdinand Pizarro, Alvarado, and some others whom he could not hope to gain. This advice, however, he declined from motives of humanity, and a desire of making his adversary appear the aggressor. For these reasons, instead of marching directly against Pizarro, he retired quietly to Cuzco; which gave his adversary time to recollect himself from the disorder into which the news of so many disasters had thrown him. He began again to practise upon Almagro those arts which had before proved successful; and Almagro again suffered himself to be deceived by pretended offers of pacification. The negotiations for this purpose were protracted for several months; and while Almagro was employed in detecting and eluding the fraudulent intentions of the governor, Gonzalo Pizarro and Alvarado found means to corrupt the soldiers who guarded them, and not only made their own escape, but persuaded 60 of Almagro's men to accompany them. There now remained only Ferdinand Pizarro in the hands of Almagro; and he was delivered by another act of treachery. The general proposed that all points of controversy should be submitted to the decision of their sovereign; and that Ferdinand Pizarro should be instantly set at liberty, and return to Spain, together with some other officers whom the general proposed to send over to show the justice of his claims. Though the intention of Pizarro by making this proposal was evident, Almagro was deceived by it, and released those whom Pizarro wanted; which he had no sooner done, than the latter threw off all disguise, and openly declared, that arms alone must now decide the matter between them. He therefore immediately set out for Cuzco with an army of 700 men, to which Almagro had only 500 to oppose. From the weakness of his forces, probably, Almagro did not attempt to guard some strong passes, through which Pizarro had to march, but waited patiently for his adversary in a plain open country.

Almagro
defeated
and taken
prisoner,

In the mean time, Pizarro advanced without any obstruction from his enemy; and an engagement soon happened, in which Almagro was defeated and taken prisoner. The conquerors behaved with great cruelty, massacring a great number of officers, and treating Almagro himself with great severity. The Indians had assembled in great numbers to see the battle, with an intention to join the vanquished party; but were so much overawed by the Spaniards, that they retired quietly after the battle was over, and thus lost the only opportunity they ever had of expelling their tyrants.—Almagro, after having for some months languished in prison, was at length formally tried, and condemned to die by Pizarro. Notwithstanding his consummate bravery, for which he was remarkable, this hardy veteran could not bear the deliberate approach of death, but condescended to use intreaties to save his life. The Pizarros, however, continued inflexible; and he was first strangled in prison, and then publicly beheaded. He left one son by an Indian woman,

And
strangled.

whom he appointed his successor, by virtue of a power granted him by the emperor.

As during these dissensions all intercourse with Spain ceased, it was some time before the accounts of the civil war were received at court. The first intelligence was given by some of Almagro's soldiers, who had left America on the ruin of their cause; and they did not fail to represent the injustice and violence of Pizarro in the strongest colours, which strongly prejudiced the emperor against him. In a short time, however, Ferdinand Pizarro arrived, and endeavoured to give matters a new turn. The emperor was uncertain which of them he ought to believe; and therefore thought it necessary to send over some person with ample powers to inquire into the merits of the cause, and to determine certainly who was in the wrong. If he found the governor still alive, he was to assume only the title of judge, in order to have the appearance of acting in concert with him; but if he was dead, the viceroy might then produce his commission appointing him Pizarro's successor in the government. This compliance to Pizarro, however, proceeded more from a dread of his power than from any other thing; for in the mean time, his brother Ferdinand was arrested at Madrid, and confined to prison, where he remained above 20 years. The person nominated to this important trust was Christoval Vaca de Castro.

While this gentleman was preparing for his voyage, Pizarro, considering himself as the unrivalled master of Peru, proceeded to parcel out its territories among the conquerors; and had this division been made with any degree of impartiality, the extent of country which he had to bestow was sufficient to have gratified his friends, and to have gained his enemies. But Pizarro conducted this transaction, not with the equity and candour of a judge attentive to discover and to reward merit, but with the illiberal spirit of a party-leader. Large districts, in parts of the country most cultivated and populous, were set apart as his own property, or granted to his brothers, his adherents, and favourites. To others, lots less valuable and inviting were assigned. The followers of Almagro, amongst whom were many of the original adventurers, to whose valour and perseverance Pizarro was indebted for his success, were totally excluded from any portion in those lands, towards the acquisition of which they had contributed so largely. As the vanity of every individual sets an immoderate value upon his own services, and the idea of each, concerning the recompence due to them, rose gradually to a more exorbitant height in proportion as their conquests extended, all who were disappointed in their expectations exclaimed loudly against the rapaciousness and partiality of the governor. The partisans of Almagro murmured in secret, and meditated revenge.

Rapid as the progress of the Spaniards in South America had been since Pizarro landed in Peru, their avidity of dominion was not yet satisfied. The officers to whom Ferdinand Pizarro gave the command of different detachments, penetrated into several new provinces; and though some of them were exposed to great hardships in the cold and barren regions of the Andes, and others suffered distress not inferior amidst the wood and marshes of the plains, they made disco-

veries

Peru. veries and conquests which extended their knowledge of the country, as well as added to their power. Pedro de Valdivia re-assumed Almagro's scheme of invading Chili; and, notwithstanding the fortitude of the natives in defending their possessions, made such progress in the conquest of the country, that he founded the city of St Jago, and gave a beginning to the establishment of the Spanish dominion there. But of all the enterprises undertaken about this period, that of Gonzales Pizarro was the most remarkable. The governor, who seems to have resolved that no person in Peru should possess any station of distinguished eminence or authority but those of his own family, had deprived Benalcazar, the conqueror of Quito, of his command in that kingdom, and appointed his brother Gonzales to take the government of it. He instructed him to attempt the discovery and conquest of the country to the east of the Andes; which, according to the information of the Indians, abounded with cinnamon and other valuable spices. Gonzales, not inferior to any of his brothers in courage, and no less ambitious of acquiring distinction, eagerly engaged in this difficult service. He set out from Quito at the head of 340 soldiers, near one half of whom were horsemen, with 4000 Indians to carry their provisions. In forcing their way through the defiles, or over the ridges of the Andes, excess of cold and fatigue, to neither of which they were accustomed, proved fatal to the greater part of the wretched attendants. The Spaniards, tho' more robust, and inured to a variety of climates, suffered considerably, and lost some men; but when they descended into the low country, their distress increased. During two months it rained incessantly, without any interval of fair weather long enough to dry their clothes. The vast plains upon which they were now entering, either altogether without inhabitants, or occupied by the rudest and least industrious tribes in the New World, yielded little subsistence. They could not advance a step but as they cut a road through woods, or made it through marshes. Such incessant toil, and continual scarcity of food, seem more than sufficient to have exhausted and dispirited any troops. But the fortitude and perseverance of the Spaniards in the 16th century were insuperable. Allured by frequent but false accounts of rich countries before them, they persisted in struggling on, until they reached the banks of the Coca or Napo, one of the large rivers whose waters pour into the Maragnon, and contribute to its grandeur. There, with infinite labour, they built a bark, which they expected would prove of great utility, both in conveying them over rivers, in procuring provisions, and in exploring the country. This was manned with 50 soldiers, under the command of Francis Orellana, the officer next in rank to Pizarro. The stream carried them down with such rapidity, that they were soon far ahead of their countrymen, who followed slowly and with difficulty by land.

At this distance from his commander, Orellana, a young man of an aspiring mind, began to fancy himself independent; and, transported with the predominant passion of the age, he formed the scheme of distinguishing himself as a discoverer, by following the course of the Maragnon until it joined the ocean, and by surveying the vast regions through which it flows. This scheme of Orellana's was as bold as it was treacherous. For, if he be chargeable with the guilt of having vio-

lated his duty to his commander, and with having abandoned his fellow-soldiers in a pathless desert, where they had hardly any hopes of success, or even of safety, but what were founded on the service which they expected from the bark, his crime is, in some measure, balanced by the glory of having ventured upon a navigation of near 2000 leagues, through unknown nations, in a vessel hastily constructed with green timber, and by very unskilful hands, without provisions, without a compass, or a pilot. But his courage and alacrity supplied every defect. Committing himself fearlessly to the guidance of the stream, the Napo bore him along to the south, until he reached the great channel of the Maragnon. Turning with it towards the coast, he held on his course in that direction. He made frequent descents on both sides the river, sometimes seizing by force of arms the provisions of the fierce savages seated on its banks, and sometimes procuring a supply of food by a friendly intercourse with more gentle tribes. After a long series of dangers, which he encountered with amazing fortitude, and of distresses which he supported with no less magnanimity, he reached the ocean, where new perils awaited him. These he likewise surmounted, and got safe to the Spanish settlement in the island Cubagua; from thence he sailed to Spain. The vanity natural to travellers who visit regions unknown to the rest of mankind, and the art of an adventurer, solicitous to magnify his own merit, concurred in prompting him to mingle an extraordinary proportion of the marvellous in the narrative of his voyage. He pretended to have discovered nations so rich, that the roofs of their temples were covered with plates of gold; and described a republic of women so warlike and powerful, as to have extended their dominion over a considerable tract of the fertile plains which he had visited. Extravagant as those tales were, they gave rise to an opinion, that a region abounding with gold, distinguished by the name of *El Dorado*, and a community of Amazons, were to be found in this part of the New World; and such is the propensity of mankind to believe what is wonderful, that it has been slowly, and with difficulty, that reason and observation have exploded those fables. The voyage, however, even when stripped of every romantic embellishment, deserves to be recorded, not only as one of the most memorable occurrences in that adventurous age, but as the first event that led to any certain knowledge of those immense regions that stretch eastward from the Andes to the ocean.

No words can describe the consternation of Pizarro, when he did not find the bark at the confluence of the Napo and Maragnon, where he had ordered Orellana to wait for him. He would not allow himself to suspect that a man, whom he had entrusted with such an important command, could be so base and so unfeeling as to desert him at such a juncture. But imputing his absence from the place of rendezvous to some unknown accident, he advanced above 50 leagues along the banks of the Maragnon, expecting every moment to see the bark appear with a supply of provisions. At length he came up with an officer whom Orellana had left to perish in the desert, because he had the courage to remonstrate against his perfidy. From him he learned the extent of Orellana's crime; and his followers perceived at once their own desperate situation, when deprived of their only resource. The spirit of the Ro-

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rest hearted veteran sunk within him; and all demanded to be led back instantly. Pizarro, though he assumed an appearance of tranquillity, did not oppose their inclination. But he was now 1200 miles from Quito; and in that long march the Spaniards encountered hardships greater than those they had endured in their progress outward, without the alluring hopes which then soothed and animated them under their sufferings. Hunger compelled them to feed on roots and berries, to eat all their dogs and horses, to devour the most loathsome reptiles, and even to gnaw the leather of their saddles and sword belts. Four thousand Indians, and 210 Spaniards, perished in this wild and disastrous expedition, which continued near two years; and as 50 men were aboard the bark with Orrellana, only 80 got back to Quito. These were naked like savages, and so emaciated with famine, or worn out with fatigue, that they had more the appearance of spectres than of men.

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A conspira-
cy formed
against the
governor;

But, instead of returning to enjoy the repose which his condition required, Pizarro, on entering Quito, received accounts of a fatal event that threatened calamities more dreadful to him than those through which he had passed. From the time that his brother made that partial division of his conquests which has been mentioned, the adherents of Almagro, considering themselves as proscribed by the party in power, no longer entertained any hope of bettering their condition. Great numbers in despair resorted to Lima, where the house of young Almagro was always open to them: and the slender portion of his father's fortune, which the governor allowed him to enjoy, was spent in affording them subsistence. The warm attachment with which every person who served under the elder Almagro devoted himself to his interests, was quickly transferred to his son, who was now grown up to the age of manhood, and possessed all the qualities which captivate the affections of soldiers. Of a graceful appearance, dexterous at all martial exercises, bold, open, generous, he seemed to be formed for command; and as his father, conscious of his own inferiority from the total want of education, had been extremely attentive to have him instructed in every science becoming a gentleman, the accomplishments which he had acquired heightened the respect of his followers, as they gave him distinction and eminence among illiterate adventurers. In this young man the Almagrians found a point of union which they wanted; and looking up to him as their head, were ready to undertake any thing for his advancement. Nor was affection for Almagro their only incitement; they were urged on by their own distresses. Many of them, destitute of common necessities, and weary of loitering away life, a burden to their chief, or to such of their associates as had saved some remnant of their fortune from pillage and confiscation, longed impatiently for an occasion to exert their activity and courage, and began to deliberate how they might be avenged on the author of all their misery. Their frequent cabals did not pass unobserved; and the governor was warned to be on his guard against men who meditated some desperate deed, and had resolution to execute it. But, either from the native intrepidity of his mind, or from contempt of persons whose poverty rendered their machinations of little consequence, he disregarded the admonitions of

his friends. "Be in no pain (said he carelessly) about my life; it is perfectly safe, as long as every man in Peru knows that I can in a moment put him to death who dares to harbour a thought against it." This security gave the Almagrians full leisure to digest and ripen every part of their scheme; and Juan de Herrada, an officer of great abilities, who had the charge of Almagro's education, took the lead in their consultations, with all the zeal which that connection inspired, and with all the authority which the assent that he was known to have over the mind of his pupil gave him.

On Sunday, the 26th of June, at mid-day, the season of tranquillity and repose in all sultry climates, murders³⁷ Herrada, at the head of 18 of the most determined conspirators, sallied out of Almagro's house in complete armour; and drawing their swords, as they advanced hastily towards the governor's palace, cried out, "Long live the king, but let the tyrant die." Their associates, warned of their motions by a signal, were in arms at different stations ready to support them. Though Pizarro was usually surrounded by such a numerous train of attendants as suited the magnificence of the most opulent subject of the age in which he lived, yet as he was just risen from table, and most of his own domestics had retired to their own apartments, the conspirators passed through the two outer courts of the palace unobserved. They were at the bottom of the staircase, before a page in waiting could give the alarm to his master, who was conversing with a few friends in a large hall. The governor, whose steady mind no form of danger could appal, starting up, called for arms, and commanded Francisco de Chaves to make fast the door. But that officer, who did not retain so much presence of mind as to obey this prudent order, running to the top of the staircase, wildly asked the conspirators what they meant, and whither they were going? Instead of answering, they stabbed him to the heart, and burst into the hall. Some of the persons who were there threw themselves from the windows; others attempted to fly; and a few drawing their swords, followed their leader into an inner apartment. The conspirators, animated with having the object of their vengeance now in view, rushed forward after them. Pizarro, with no other arms than his sword and buckler, defended the entry, and, supported by his half-brother Alcantara and his little knot of friends, maintained the unequal contest with intrepidity worthy of his past exploits, and with the vigour of a youthful combatant. "Courage (cried he), companions, we are yet enow to make those traitors repent of their audacity." But the armour of the conspirators protected them, while every thrust they made took effect. Alcantara fell dead at his brother's feet; his other defendants were mortally wounded. The governor, so weary that he could hardly wield his sword, and no longer able to parry the many weapons furiously aimed at him, received a deadly thrust full in his throat, sunk to the ground, and expired.

As soon as he was slain, the assassins ran out into the streets, and waving their bloody swords, proclaimed the death of the tyrant. Above 200 of their associates having joined them, they conducted young Almagro in solemn procession through the city; and assembling the magistrates and principal citizens, com-
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pelled

peru. compelled them to acknowledge him as lawful successor to his father in his government. The palace of Pizarro, together with the houses of several of his adherents, were pillaged by the soldiers; who had the satisfaction at once of being avenged on their enemies, and of enriching themselves by the spoils of those through whose hands all the wealth of Peru had passed.

The new governor marched into the heart of the empire, in order to reduce such places as refused to acknowledge his authority. A multitude of rustians joined him on his march. His army breathed nothing but vengeance and plunder: every thing gave way before it. If the military talents of the general had equalled the ardour of his troops, the war had ended here. Unhappily for Almagro, he had lost his conductor John de Herrada. His inexperience made him fall into the snares that were laid for him by Pedro Alvarez, who had put himself at the head of the opposite party. He lost, in attempting to unravel his plots, that time that he ought to have employed in fighting. In these circumstances, an event, which no one could have foreseen, happened to change the face of affairs.

The licentiate Vaca di Castro, who had been sent from Europe to try the murderers of old Almagro, arrived at Peru. As he was appointed to assume the government in case Pizarro was no more, all who had not sold themselves to the tyrant hastened to acknowledge him. Uncertainty and jealousy, which had for too long a time kept them dispersed, were no longer an obstacle to their re-union. Castro, who was as resolute as if he had grown old in the service, did not suffer their impatience to languish, but instantly led them against the enemy. The two armies engaged at Chapas on the 16th of September 1542, and fought with inexpressible obstinacy. Victory, after having wavered a long time, at the close of the day decided in favour of that party whose cause was the most just. Those among the rebels who were most guilty, dread ing to languish under disgraceful tortures, provoked the conquerors to murder them, crying out, like men in despair, *It was I who killed Pizarro*. Their chief was taken prisoner, and died on the scaffold.

While these scenes of horror were transacting in America, the Spaniards in Europe were employed in finding out expedients to terminate them; though no measures had been taken to prevent them. Peru had only been made subject to the audience of Panama, which was too remote to superintend the maintenance of good order, and had too little influence to make its decrees respected. A supreme tribunal was then established at Lima for the dispensation of justice, which was to be invested with authority sufficient to enforce and to reward a due obedience to the laws. Blasco Nunez Vela, who presided in it as viceroy, arrived in 1544, attended by his subordinates in office, and found every thing in the most dreadful disorder.

To put an end to these tumults which now subsisted, would have required a profound genius, and many other qualities which are seldom united. Nunez had none of these advantages. Nature had only given him probity, firmness and ardour; and he had taken no pains to improve these gifts. With these virtues, which were almost defects in his situation, he began to fulfil

his commission, without regard to places, persons, or circumstances.

Contrary to the opinion of all intelligent persons, who wished that he should wait for fresh instructions from Europe, he published ordinances, which declared that the lands the conquerors had seized should not pass to their descendants, and which dispossessed those who had taken part in the civil commotions. All the Peruvians who had been enslaved by monks, bishops, and persons belonging to the government, were declared free. Those who belonged to other masters were to be freed from their shackles at the death of their oppressors. They could no longer be compelled to bury themselves in the mines, nor could any kind of labour be exacted from them without payment. Their tribute was fixed. The Spaniards who travelled on foot were deprived of the right of taking three Indians to carry their baggage; and those who travelled on horseback, of the right of taking five. The caciques were discharged from the obligation of furnishing the traveller and his retinue with provisions gratis. Other tyrannical establishments also would soon have been proscribed; and the conquered people were on the eve of being sheltered under the protection of laws, which would at least have tempered the rigours of the right of conquest, if even they had not entirely repaired the injustice of them; but it should seem that the Spanish government was only to be unfortunate in the good it attempted to effect.

A change so unexpected filled those with consternation who saw their fortunes wrested from them, or who lost the flattering hope of transmitting them to their posterity. Even those who were not affected by these interested views, being accustomed to look upon the Indians as the instruments and victims of their avarice, had no conception that any other ideas could prevail concerning them. From astonishment they proceeded to indignation, murmuring, and sedition. The viceroy was degraded, put in irons, and banished to a desert island, till he could be conveyed to Spain.

Gonzales Pizarro was then returned from his hazardous expedition, which had employed him long enough to prevent him from taking a part in those revolutions which had so rapidly succeeded each other. The anarchy he found prevailing at his return, inspired him with the idea of seizing the supreme authority. His fame and his forces made it impossible that this should be refused him; but his usurpation was marked with so many enormities, that Nunez was regretted. He was recalled from exile, and soon collected a sufficient number of forces to enable him to take the field. Civil commotions were then renewed with extreme fury by both parties. No quarter was asked or given on either side. The Indians took part in this as they had done in the preceding wars; some ranged themselves under the standard of the viceroy, others under the banners of Gonzales. From 15,000 to 20,000 of these unhappy wretches, who were scattered about in each army, dragged up the artillery, levelled the roads, carried the baggage, and destroyed one another. Their conquerors had taught them to be sanguinary. After a variety of advantages for a long time alternately obtained, fortune at length favoured the rebellion under

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the walls of Quito in the month of January, in the year 1545; and Nunez with the greatest part of his men were massacred.

Pizarro took the road of Lima, where they were deliberating on the ceremonies with which they should receive him. Some officers wished that a canopy should be carried for him to march under, after the manner of kings. Others, with adulation still more extravagant, pretended that part of the walls of the town, and even some houses, must be pulled down; as was the custom at Rome, when a general obtained the honour of a triumph. Gonzales contented himself with making his entrance on horseback, preceded by his lieutenant, who marched on foot. Four bishops accompanied him, and he was followed by the magistrates. The streets were strewn with flowers, and the air resounded with the noise of bells and various musical instruments. This homage totally turned the head of a man naturally haughty, and of confined ideas. He spoke and acted in the most despotic manner.

Had Gonzales possessed judgment and the appearance of moderation, it would have been possible for him to render himself independent. The principal persons of his party wished it. The majority would have beheld this event with indifference, and the rest would have been obliged to consent to it. Blind cruelty, insatiable avarice, and unbounded pride, altered these dispositions. Even those, whose interests were connected with those of the tyrant, wished for a deliverer.

⁴¹ An end put to the troubles by Pedro di la Gasca. Such a deliverer arrived from Europe in the person of the licentiate Pedro di la Gasca. The squadron and the provinces of the mountains immediately declared for a person who was invested with a lawful authority to govern them. Those who lived concealed in deserts, caverns, and forests, quitted their retreats to join him. Gonzales, who saw no resource left to support him but in some great achievement, took the road of Cuzco, with a resolution to give battle. At some leagues distance from this place he met the royal army, and attacked it on the 9th of June 1548. One of his lieutenants, seeing him abandoned at the first charge by his best soldiers, advised him to throw himself into the enemy's battalions, and perish like a Roman; but this weak man chose rather to surrender, and end his life on a scaffold. Carvajal, a more able warrior, and more ferocious than himself, was quartered. This man, when he was expiring, boasted that he had massacred with his own hand 1400 Spaniards and 20,000 Indians.

Such was the last scene of a tragedy, of which every act has been marked with blood. The government was moderate enough not to continue the proscriptions; and the remembrance of the horrid calamities they had suffered kept the Spaniards in the bounds of subjection. What still remained of that commotion that had been raised in their minds, insensibly sunk into a calm; and the country hath remained in quiet ever since.

⁴³ Hard fate of the Peruvians. With regard to the Peruvians, the most cruel measures were taken to render it impossible for them to rebel. Tupac Amaru, the heir of their last king, had taken refuge in some remote mountains, where he lived in peace. There he was so closely surrounded by the

troops which had been sent out against him, that he was forced to surrender. The viceroy Francis de Toledo caused him to be accused of several crimes that he had not committed, and for which he was beheaded in 1571. All the other descendants of the Incas shared the same fate, under pretence that they had conspired against their conquerors. The horror of these enormities excited so universal an indignation both in the Old and the New World, that Philip II. thought himself obliged to disavow them; but the infamous policy of this prince was so notorious, that no credit was given to this appearance of his justice and humanity.

The empire of Peru, at the time it was subdued, extended along the South Sea, from the river of the emeralds to Chili, and on the land side to Popayan, according to some geographers. It contained within its extent that famous chain of mountains which rises in the Terra Magellanica, and is gradually lost in Mexico, in order to unite, as it should seem, the southern parts of America with the northern.

It is now divided into three great divisions or audiences; Quito, Lima, or Los Reyes, and Los Charcos. As to its climate, mines, soil, and produce, they differ greatly in different parts of the country.

The extensive province of Quito is bounded on the north by Popayan, and includes a part of that government, also by Santa Fe de Bogota; on the south by the governments of Piura and Chachapoyas; on the east it extends over the whole government of Maynas and the river of the Amazons to the meridian, which divides the Spanish from the Portuguese dominions; and on the west it is bounded by the South Sea; extending, according to Antonio de Ulloa, 600 leagues in length, and about 200 in its greatest breadth; but this greatly exceeds the computation of all other geographers. He however observes, that it must be owned a great part of those vast dominions are either inhabited by nations of Indians, or have not hitherto been sufficiently peopled by the Spaniards, if indeed they have been thoroughly known; and that all the parts that can properly be said to be peopled, and actually subject to the Spanish government, are those intercepted by the two Cordilleras of the Andes, which, in comparison to the extent of the country, may be termed a street or lane, 15 leagues, or sometimes more, from east to west; to this must be added several detached governments, separated by the very extensive tracts inhabited by free Indians.

The climate of Quito differs from all others in the same parallel, since even in the centre of the torrid zone, or although under the equinoctial, the heat is not only very tolerable, but even in some places the cold is painful; while others enjoy all the advantages of a perpetual spring, the fields being constantly covered with verdure, and enamelled with flowers of the most lively colours. The mildness of the climate, free from the extremes of heat and cold, and the constant equality of the day and night, render this country, which from its situation might be thought to be parched by the constant heat of the sun, and scarcely inhabitable, both pleasant and fertile; for nature has here dispensed her blessings with so liberal a hand, that this country in several respects surpasses those of the temperate zones, where the vicissitudes of winter and summer, and the change

Peru. change from heat to cold, cause the extremes of both to be more sensibly felt. However, in different parts of the country, the air is very different; in one part are mountains of a stupendous height and magnitude, with their summits covered with snow. The plains are temperate, the valleys hot, and, according to the high or low situation of the country, are found all the variety of gradations in temperature possible to be conceived between the extremes of heat and cold.

Quito, the capital, in $0^{\circ} 13'$ south latitude, and $77^{\circ} 50'$ west longitude from Greenwich, is so happily situated, that neither heat nor cold are troublesome, though both may be felt in its neighbourhood; and what renders this equality more delightful is, that it is constant throughout the whole year, the difference between the seasons being scarce perceptible. Indeed the mornings are cool, the remainder of the day warm, and the nights of an agreeable temperature. See QUITO.

The winds, which are pure and salubrious, blow for the most part from north to south, but never with any violence, though they sometimes shift their quarters, but without any regard to the season of the year. Such signal advantages resulting from the climate, soil, and aspect of this country, would be sufficient to render it the most enviable spot upon earth, as it is supposed to be the most elevated, if, whilst enjoying these delights, the inhabitants were not harassed by terror, and exposed to continual danger; for here tremendous tempests of thunder and lightning prevail, which are sufficient to appal the stoutest heart; whilst earthquakes frequently spread universal apprehensions, and sometimes bury cities in ruins.

The distinction of winter and summer consists in a very minute difference; the interval between the month of September and those of April, May, or June, is here called the winter season, and the other months compose the summer. In the former season the rain chiefly prevails, and in the latter the inhabitants frequently enjoy whole days of fine weather; but whenever the rains are discontinued for above a fortnight, the inhabitants are in the utmost consternation, and public prayers are offered up for their return. On the other hand, when they continue a short time without intermission, the like fears prevail, and the churches are again crowded with supplicants to obtain fine weather; for a long drought produces dangerous diseases, and a continual rain, without intervals of sunshine, destroys the fruits of the earth. The city of Quito, however, enjoys one peculiar advantage in being free from musketoes and other troublesome insects, such as fleas and venomous reptiles, except the *nigua*, or *pique*, which is a very small insect shaped like a flea, but hardly visible to the sight. See CHEROF.

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s. &c. The fertility of the soil here is incredible, for the fruits and beauties of the several seasons are visible at the same time; and the curious European observes with a pleasing admiration, that while some herbs of the field are fading, others of the same kind are springing up; while some flowers lose their beauty, others blow to continue the enamelled prospect: thus, when the fruits of the trees have attained their maturity, and the leaves begin to change their colour, fresh leaves blossom, and fruits are seen in their proper gradations in size and ripeness on the same tree. The same incessant fertility is conspicuous in the corn, both reaping and

sowing being carried on at the same time: so that the declivities of the neighbouring hills exhibit all the beauties of the four seasons in one assemblage. Though all this is generally seen, yet there is a suited time for the grand harvest: yet sometimes the most favourable season for sowing in one place is a month or two after that of another, though their distance does not exceed three or four leagues. Thus in different spots, and sometimes in one and the same, sowing and reaping are performed throughout the whole year, the forwardness or retardment naturally arising from the different situations, such as mountains, rising grounds, plains, and valleys; and the temperature being different in each, the best times for performing the several operations of husbandry must also differ.

The *chirimoya* is considered as one of the most delicious fruits in the world. Its dimensions are various, being from one to five inches in diameter. Its figure is imperfectly round, flattened towards the stalk, where it forms a kind of navel; but all the other parts are nearly circular. It is covered with a thin soft shell, which adheres so closely to the pulp as not to be separated from it without a knife. The outward coat is green, variegated with prominent veins, forming all over it a kind of net-work. The pulp is white, and contains a large quantity of juice resembling honey, of a sweet taste, mixed with a gentle acid of a most exquisite flavour. The seeds are formed in several parts of the pulp, and are somewhat flat. The tree is high and tufted, the stem large and round, but with some inequalities, full of elliptic leaves, terminating in a point. The blossom differs little from the colour of the leaves, which is a darkish green; and though far from being beautiful, is remarkable for its incomparable fragrance.

The *granadilla* in its shape resembles an hen's egg, but is larger. The outside of the shell is smooth, glossy, and of a faint carnation colour, and the inside white and soft. The shell contains a viscous liquid substance full of very small and delicate grains, less hard than those of the pomegranate. This medullary substance is separated from the shell by a fine and transparent membrane. Its fruit has a delightful sweetness blended with acidity, very cordial and refreshing, and so wholesome, that there is no danger of eating to excess.

The *frutilla*, or Peruvian strawberry, is very different from that of Europe in size; for though they are here generally not above an inch in length, they are much larger in other parts of Peru; but their taste, though juicy, and not unpalatable, is not equal to those in Europe.

The country is observed to abound more in women than in men, which is the more remarkable, as those causes which induce men to leave their country, as travelling, commerce, and war, naturally bring over more men from Europe than women. But there are many families in which there are a number of daughters, without one son among them. The women enjoy a better state of health than the men, which may be owing in some measure to the climate, and more particularly to the early intemperance and voluptuousness of the other sex.

The Creoles are well made, of a proper stature, and of a lively and agreeable countenance. The *Mestizos* are also in general well made, often taller than the ordinary

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inhabitants.

Peru.

ordinary size, very robust, and have an agreeable air. The Indians, both men and women, are commonly low of stature, though strong and well proportioned: but more natural defects are to be found among them than in any of the rest. Some are remarkably short, some idiots, dumb, or blind. Their hair is generally thick and long, which they wear loose on their shoulders; but the Indian women plait theirs behind with a ribbon, and cut that before a little above the eye brows, from one ear to the other. The great disgrace that can be offered to an Indian of either sex is to cut off their hair; for whatever corporal punishment their masters think proper to inflict on them, they bear with patience; but this affront they never forgive; and accordingly the government has interposed, and limited this punishment to the most enormous crimes. The colour of the hair is generally a deep black: it is lank, harsh, and as coarse as that of a horse. On the contrary, the male Mestizos, in order to distinguish themselves from the Indians, cut off their hair; but the females do not adopt that custom.

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Their dress.

The Mestizos in general wear a blue cloth, manufactured in this country; but though they are the lowest class of Spaniards, they are very ambitious of distinguishing themselves as such, either by the colour or fashion of the clothes they wear.

The Mestizo women affect to dress in the same manner as the Spanish, though they cannot equal the ladies in the richness of their stuffs. The meaner sort wear no shoes; but, like the men of the same rank, go barefooted.

The dress of the Indians consists of white cotton drawers, which hang down to the calf of the leg, where they are loose, and edged with a lace suitable to the stuff. The use of a shirt is supplied by a black cotton frock, made in the form of a sack, with three openings at the bottom, one in the middle for the head, and others at the corners for the arms; thus covering their naked bodies down to the knees. Over this is a serge cloak, with a hole in the middle for putting the head through, and a hat made by the natives. This is their general dress, which they never lay aside, even while they sleep; and they have no additional clothing for their legs or feet. The Indians, who have acquired some fortune, particularly the barbers and phlebotomists, distinguish themselves from their countrymen by the fineness of their drawers, and by wearing a shirt, which, though without sleeves, has a lace four or five fingers in breadth, fastened round like a kind of ruff or band. They are fond of silver or gold buckles to their shoes, though they wear no stockings; and instead of a mean serge cloak, wear one of fine cloth, which is often adorned with gold or silver lace.

There are two kinds of dresses worn by the Indian women, made in the same plain manner with those worn by the men in general, the whole consisting of a short petticoat and a veil of American baize. But the dress of the lowest class of Indian women is only a bag of the same make and stuff as that of the men, which they fasten on their shoulders with two large pins: it reaches down to the calf of the leg, and is fastened round the waist with a kind of girdle. Instead of a veil, they wear about the neck a piece of the same

coarse stuff, dyed black; but their arms and legs are naked.

The people have dishes unknown in Europe; but are particularly fond of cheese; and have excellent butter in the neighbourhood of Quito. Sweetmeats are very much admired.

Ruin is commonly drank here by persons of all ranks, but their favourite liquor is brandy. The disorders arising from the excessive use of spirituous liquors are chiefly seen among the Mestizos; and the lower class of women, both among the Creoles and Mestizos, are also extremely addicted to the same species of debauchery.

Another liquor much used in this country is mate, which is made of an herb known in all these parts of America by the name of Paraguay, as being the produce of that country. Some of it is put into a calabash tipped with silver, called here *mate*, with sugar and some cold water. After it has continued there some time, the calabash is filled with boiling water, and they drink the liquor through a pipe fixed in the calabash. It is also usual to squeeze into the liquor a small quantity of the juice of lemons or Seville oranges, mixed with some perfumes from odoriferous flowers. This is their usual drink in the morning fasting, and many use it also at their evening regale. The manner of drinking it appears very indelicate, the whole company taking it successively through the same pipe, it being carried several times round the company till all are satisfied. This among the Creoles is the highest enjoyment: so that when they travel, they never fail to carry with them a sufficient quantity of it, and till they have taken their dose of mate they never eat.

The vice of gaming is here carried to an extravagant height, to the ruin of many families, some losing their stocks in trade, others the very clothes from their backs, and afterward those belonging to their wives, which they hazard, stimulated by the hope of recovering their own.

The common people, the Indians, and even the domestics, are greatly addicted to stealing. The Mestizos, though arrant cowards, do not want audacity in this way; for though they will not venture to attack any one in the street, it is a common practice to snatch off a person's hat, and immediately seek their safety in flight. This acquisition is sometimes of considerable value; the hats worn by persons of rank, and even by the wealthy citizens when dressed, being of white beaver, worth fifteen dollars, beside the husband of gold or silver lace, fastened with a gold buckle set with diamonds or emeralds. Robberies on the highway are seldom heard of.

In Quito, and all the towns and villages of its province, different dialects are spoken, Spanish being no less common than the Inga, the language of the country. The Creoles use the latter as much as the former, but both are considerably adulterated by borrowed words and expressions. The first language generally spoken by children is the Inga; for the nurses being Indians, many of them do not understand a word of Spanish, and thus they afterward learn a jargon composed of both languages.

The sumptuous manner of performing the last offices for the dead, demonstrates how far the power of the dead has

Peru.

Food and drink, &c.

51
Language.52
Honour paid the dead.

Peru. habit is capable of prevailing over reason and prudence, for their ostentation is so great in this particular, that many families of credit are ruined by preposterously endeavouring to excel others; and the people here may be said to toil and scheme to lay up wealth, to enable their successors to lavish honours upon a body insensible of all pageantry.

53 commerce. The commerce of the province of Quito is chiefly carried on by Europeans settled here, and others who occasionally arrive. The manufactures of this province are only cottons, some white and striped baize, and cloths, which meet with a good market at Lima, for supplying the inward provinces of Peru. The returns are made partly in silver, and partly in fringes made of gold and silver thread, and wine, brandy, oil, copper, tin, lead, and quicksilver. On the arrival of the galleons at Carthagena, these traders resort thither to purchase European goods, which, at their return, they consign to their correspondents all over the province. The coasts of New Spain supply this province with indigo, of which there is a very large consumption at the manufactures, blue being universally the colour which this people adopt for their apparel. They also import, by way of Guayaquila, iron and steel both from Europe and the coast of Guatemala.

54 position the inhabitants. The disposition of the Indians in the province of Quito is extremely remarkable, and they appear to have no resemblance to the people found there by those who first discovered the country. They at present possess a tranquillity not to be disturbed either by fortunate or unfortunate events. In their mean apparel they are as contented as a prince clothed in the most splendid robes. They show the same disregard to riches; and even the authority and grandeur within their reach is so little the object of their ambition, that to all appearance it seems to be the same to an Indian whether he be created an alcalde or obliged to perform the office of a common executioner.

Their sloth is so great, that scarcely any thing can induce them to work. Whatever therefore is necessary to be done is left to the Indian women, who are much more active; they spin and make the half shirts and drawers which form the only apparel of their husbands; they cook the provisions, grind barley, and brew the beer called *chicha*; while the husband sits squatting on his hams, the usual posture of the Indians, looking at his busy wife. The only domestic service they do is to plough their little spot of land, which is sowed by the wife. When they are once seated on their hams, no reward can induce them to stir; so that if a traveller has lost his way, and happens to come to one of their cottages, they charge their wives to say that they are not at home. Should the passenger alight and enter the cottage, the Indian would still be safe; for having no light but what comes through a hole in the door, he could not be discovered; and

Peru. should the stranger even see the Indian, neither entreaties nor rewards would prevail on him to stir a step with him.

They are lively only in parties of pleasure, rejoicings, entertainments, and especially dancing; but in all these the liquor must circulate briskly, and they continue drinking till they are entirely deprived both of sense and motion.

It is remarkable that the Indian women, whether maids or married, and Indian young men before they are of an age to contract matrimony, are never guilty of this vice: it being a maxim among them, that drunkenness is the privilege of none but masters of families, who, when they are unable to take care of themselves, have others to take care of them.

The women present the *chicha* (A) to their husbands in calabashes, till their spirits are raised; then one plays on a pipe and tabor, while others dance. Some of the best voices among the Indian women sing songs in their own language, and those who do not dance, squat down in the usual posture till it comes to their turn. When tired with intemperance, they all lie down together, without regarding whether they be near the wife of another or their own sister or daughter. These festivities sometimes continue three or four days, till the priest coming among them, throws away all the *chicha*, and disperses the Indians, lest they should procure more.

Their funerals are likewise solemnized with excessive drinking. The house is filled with jugs of *chicha*, for the solace of the mourners and other visitors; the latter even go out into the streets, and invite all of their nation who happen to pass by to come in and drink to the honour of the deceased. This ceremony lasts four or five days, and sometimes more, strong liquor being their supreme enjoyment.

55 Their manner of contracting marriages. The Indians in the audience of Quito are said to act contrary to all other nations in their marriages; for they never make choice of a woman who has not been first enjoyed by others, which they consider as a certain indication of her personal attractions. After a young man has made choice of a woman, he asks her of her father, and having obtained his consent, they begin to cohabit together as man and wife, and assist the father-in-law in cultivating the land. At the end of three or four months, and frequently of a year, the husband leaves his bride or wife without any ceremony; and perhaps expostulates with his father-in-law for endeavouring to deceive him, by imposing upon him his daughter, whom nobody else had thought worthy of making a bedfellow. But if no disgust arises in the man on this account or any other, after passing three or four months in this commerce, which they call *amanarse*, or to habituate one's self, they then marry. This custom is still very common, though the whole body of the clergy have used all their endeavours to put a stop to it. Accordingly they always absolve

(A) This is a liquor made from maize by the following process. The maize, after being soaked in water till it begin to grow, is dried in the sun, then parched a little, and at last ground. The flour, after it has been well kneaded, is put with water into a large vessel, and left for two or three days to ferment. Its taste is nearly that of the most indifferent kind of cyder. It is a refreshing, nourishing, and aperitive liquor, but it will not keep above eight days without turning sour.

Peru. absolve them of that sin before they give them the nuptial benediction.

56
Appear-
ance of the
country in
this pro-
vince. It has been observed, that the dependencies of the jurisdictions of Quito are seated between the two Cordilleras of the Andes, and that the air is more or less cold, and the ground more or less sterile, according to the height of the mountains. These barren tracks are called deserts; for though all the Cordilleras are dry, some are much more so than others; and the continual snow and frosts render some parts of them incapable of producing a single plant, and consequently they are uninhabitable by man or beast.

Some of these mountains, which appear to have their bases resting on other mountains, rise to a most astonishing height, and, reaching far above the clouds, are here, although in the midst of the torrid zone, covered with perpetual snow. From experiments made with a barometer on the mountain of Cotopaxi, it appeared that its summit was elevated 6252 yards above the surface of the sea, something above three geographical miles, which greatly exceeds the height of any other mountain in the known world.

Cotopaxi became a volcano about the time when the Spaniards first arrived in this country. A new eruption happened in 1743, which had been for some days preceded by a continual interior rumbling noise; after which an aperture was made in its summit, as also three others near the middle of its declivity; these parts, when the eruption commenced, were buried under prodigious masses of snow. The ignited substances which were ejected being mingled with a considerable quantity of snow and ice, melting amidst the flames, were carried down with such amazing rapidity, that the plain from Callo to Latacunga was overflowed, and all the houses with their wretched inhabitants were swept away in one general and instantaneous destruction. The river of Latacunga was the receptacle of this dreadful flood, till becoming swollen above its banks, the torrent rolled over the adjacent country, continuing to sweep away houses and cattle, and rendered the land near the town of the same name as the river one vast lake. Here, however, the inhabitants had sufficient warning to save their lives by flight, and retreated to a more elevated spot at some distance. During three days the volcano ejected cinders, while torrents of lava with melted ice and snow poured down the sides of the mountain. The eruption continued for several days longer, accompanied with terrible roarings of the wind, rushing through the craters which had been opened. At length all was quiet, and neither smoke nor fire were to be seen; until in May 1744 the flames forced a passage through several other parts on the sides of the mountain; so that in clear nights the flames, being reflected by the transparent ice, exhibited a very grand and beautiful illumination. On the 13th of November following, it ejected such prodigious quantities of fire and lava, that an inundation equal to the former soon ensued, and the inhabitants of the town of Latacunga for some time gave themselves over for lost.

The most southern mountains of the Cordilleras is that of Mecas or Sangay, which is of a prodigious height, and the far greatest part of it covered with snow; yet from its summit issues a continual fire, attended with explosions which are plainly heard at 40

leagues distance. The country adjacent to this volcano is entirely barren, being covered with cinders ejected from its mouth. In this mountain rises the river Sangay, which being joined by the Upano, forms the Payra, a large river which discharges itself into the Marañon.

Pichincha, though famous for its great height, is 1278 yards lower than the perpendicular height of Cotopaxi, and was formerly a volcano, but the mouth or crater on one of its sides is now covered with sand and calcined matter; so that at present neither smoke nor fire issue from it. When Don George Juan and Don Antonio de Ulloa were stationed on it for the purpose of making astronomical observations, they found the cold on the top of this mountain extremely intense, the wind violent, and they were frequently involved in so thick a fog, or, in other words, a cloud, that an object at six or eight paces distance was scarcely discernible. The air grew clear, by the clouds moving nearer to the earth, and on all sides surrounding the mountain to a vast distance, representing the sea with the mountain standing like an island in the centre. When this happened, they heard the dreadful noise of the tempests that discharged themselves on Quito and the neighbouring country. They saw the lightning issue from the clouds, and heard the thunder roll far beneath them. While the lower parts were involved in tempests of thunder and rain, they enjoyed a delightful serenity; the wind was abated, the sky clear, and the enlivening rays of the sun moderated the severity of the cold. But when the clouds rose, their thickness rendered respiration difficult: snow and hail fell continually, and the wind returned with all its violence; so that it was impossible entirely to overcome the fear of being, together with their hut, blown down the precipice on whose edge it was built, or of being buried in it by the constant accumulations of ice and snow. Their fears were likewise increased by the fall of enormous fragments of rocks. Though the smallest crevice visible in their hut was stopped, the wind was so piercing that it penetrated through; and though the hut was small, crowded with inhabitants, and had several lamps constantly burning, the cold was so great, that each individual was obliged to have a chafing dish of coals, and several men were constantly employed every morning to remove the snow which fell in the night. By the severities of such a climate their feet were swelled, and so tender that walking was attended with extreme pain, their hands covered with chilblains, and their lips so swelled and chapt that every motion in speaking drew blood.

57
The next division of Peru is the audience of Lima, Province
which is bounded on the north by Quito, on the east Lima.
by the Cordilleras of the Andes, on the south by the audience of Los Charcos, and on the west by the Pacific Ocean, it being about 770 miles in length from north to south, but of an unequal breadth.

58
The climate and soil of this country is uncommonly Climate,
various; in some places it is exceedingly hot, in others Soil, &c.
insupportably cold, and in the city of Lima, where rain never falls, it is always temperate. The seasons vary within the compass of a few miles, and in certain parts of the audience all the vicissitudes of weather are experienced in 24 hours. It is extremely remarkable that no rains fall or rivers flow on the sea-coasts, tho' in this Province.

the country is refreshed by thick fogs, and the heat abated by dense clouds that never condense into showers. This phenomenon has drawn the attention of many naturalists, without their being able satisfactorily to account for it.

Spring begins toward the close of the year, that is about the end of November or the beginning of December, when the vapours which fill the atmosphere during the winter subside, and the sun, to the great joy of the inhabitants, again appears, and the country then begins to revive, which, during the absence of his rays, had continued in a state of languor. This is succeeded by summer, which, though hot from the perpendicular direction of the sun's rays, is far from being insupportable; the heat, which indeed would otherwise be excessive, being moderated by the south winds, which always blow at this season, though with no great force. Winter begins at the latter end of June or the beginning of July, and continues till November or December, when the south winds begin to blow stronger, and to produce a certain degree of cold, not indeed equal to that in countries where ice and snow are known, but so keen that the light dresses are laid by, and cloth or other warm stuffs worn. During the winter the earth is covered with so thick a fog, as totally to intercept the rays of the sun; and the winds, by blowing under the shelter of this fog, retain the particles they contracted in the frozen zone. In this season only the vapours dissolve into a very small dew, which everywhere equally moistens the earth; by which means all the hills, which during the other parts of the year offer nothing to the sight but rocks and wastes, are clothed with verdure and enamelled with flowers of the most beautiful colours. These dews never fall in such quantities as to impair the roads or incommode the traveller; a very thin stuff will not soon be wet through; but the continuance of the mists during the whole winter, without being exhaled by the sun, fertilizes every part of the country.

Lima is as free from tempests as from rain; so that those of the inhabitants who have neither visited the mountains nor travelled into other parts, are absolute strangers to thunder and lightning, and are therefore extremely terrified when they first hear the former or see the latter. But it is very remarkable, that what is here entirely unknown should be so common 30 leagues to the east of Lima; it being no farther to the mountains, where violent rains and tempests of thunder and lightning are as frequent as at Quito.

But though the capital is freed from the terror of these tempests, it is subject to what is much more dreadful. Earthquakes happen here so frequently, that the inhabitants are under continual apprehensions of being, from their suddenness and violence, buried in the ruins of their own houses: yet these earthquakes, though so sudden, have their prefaces, one of the principal of which is a rumbling noise in the bowels of the earth about a minute before the shocks are felt, that seems to pervade all the adjacent subterraneous part; this is followed by dismal howlings of the dogs, who seem to preface the approaching danger. The beasts of burden passing the streets stop, and by a natural instinct spread open their legs, the better to secure themselves from falling. On these portents the terrified inhabitants fly from their houses into the streets with such

precipitation, that if it happens in the night they appear quite naked; the urgency of the danger at once banishing all sense of delicacy or shame. Thus the streets exhibit such odd and singular figures as might afford matter of diversion, were it possible to be diverted in so terrible a moment. This sudden concourse is accompanied with the cries of children waked out of their sleep, blended with the lamentations of the women, whose agonizing prayers to the saints increase the common fear and confusion. The men are also too much affected to refrain from giving vent to their terror; so that the whole city exhibits a dreadful scene of consternation and horror.

The earthquakes that have happened at the capital are very numerous. The first since the establishment of the Spaniards was in 1582; but the damage was much less considerable than in some of the succeeding. Six years after Lima was again visited by another earthquake, so dreadful, that it is still solemnly commemorated every year. In 1609 another happened, which overturned many houses. On the 27th of November 1630, such prodigious damage was done in the city by an earthquake, that, in acknowledgment of its not having been entirely demolished, a festival on that day is annually celebrated. Twenty-four years after, on the 3d of November, the most stately edifices in the city, and a great number of houses, were destroyed by an earthquake; but the inhabitants retiring, few of them perished. Another dreadful one happened in 1678; but one of the most terrible was on the 28th of October 1687. It began at four in the morning, and destroyed many of the finest public buildings and houses, in which a great number of the inhabitants perished; but this was little more than a prelude to what followed; for two hours after the shock returned with such impetuous concussions, that all was laid in ruins, and the inhabitants felt themselves happy in being only spectators of the general devastation, by having saved their lives, though with the loss of all their property. During this second shock, the sea retiring considerably, and then returning in mountainous waves, entirely overwhelmed Callao, which is at five miles distance from Lima, and all the adjacent country, together with the miserable inhabitants. From that time six earthquakes have happened at Lima previous to that of 1746. This last was on the 28th of October, at half an hour after ten at night, when the concussions began with such violence, that in little more than three minutes the greatest part, if not all the buildings in the city, were destroyed, burying under their ruins those inhabitants who had not made sufficient haste into the streets and squares, the only places of safety. At length the horrible effects of the first shock ceased; but the tranquillity was of short duration, the concussions swiftly succeeding each other. The fort of Callao also sunk into ruins; but what it suffered from the earthquake in its building was inconsiderable, when compared to the dreadful catastrophe which followed; for the sea, as is usual on such occasions, receding to a considerable distance, returned in mountainous waves, foaming with the violence of the agitation, and suddenly buried Callao and the neighbouring country in its flood. This, however, was not entirely effected by the first swell of the waves; for the sea retiring farther, returned with still greater impetuosity, and covered both

Pers.

Peru.

the walls and other buildings of the place; so that what even had escaped the first inundation was totally overwhelmed by these succeeding mountainous waves. Twenty-three ships and vessels, great and small, were then in the harbour, 10 of which were sunk, and the other 13, among which was a frigate named St Fermin, were carried by the force of the waves to a considerable distance up the country. This terrible inundation and earthquake extended to other parts on the coast, and several towns underwent the same fate as the city of Lima; where the number of persons who perished within two days after it began, amounted, according to the bodies found, to 1300, beside the maimed and wounded, many of whom lived only a short time in great torture.

The country of Lima enjoys great fertility, producing all kinds of grain and a prodigious variety of fruit. Here industry and art supply that moisture which the clouds withhold. The ancient Incas of Peru caused small canals to be formed, in order to conduct the waters of the rivers to every part of the country. The Spaniards, finding these useful works executed to their hands, had only to keep them in order; and by these are watered spacious fields of barley, large meadows, plantations, vineyards, and gardens, all yielding uncommon plenty. Lima differs from Quito, where the fruits of the earth have no determined season; for here the harvest is gathered in, and the trees drop their leaves in the proper season.

Although the summer here is hot, yet venomous creatures are unknown; and the same may be said of the territory called *Valles*, though here are some ports, as Tumbez and Piura, where the heat is almost as great as that of Guayaquil. This singularity can therefore proceed from no other cause than the natural drought of the climate.

The audience of Lima is divided into four bishoprics, Truxillo, Guamanga, Cusco, and Arequipa. The diocese of Truxillo lies to the north of the archiepiscopal diocese of Lima, and like all the others is divided into several jurisdictions. The city of Truxillo is seated in 8° 6' south latitude, in a pleasant situation, though in a sandy soil.

In the diocese of Guamanga is a rich quicksilver mine, from which the inhabitants of a neighbouring town procure their whole subsistence; the coldness of the air in that place checking the growth of all kinds of grain and fruit, so that they are obliged to purchase them from their neighbours. The quicksilver mines wrought here supply all the silver mines in Peru with that necessary mineral, and notwithstanding the prodigious quantities already extracted, no diminution is perceived.

Cusco, which gives name to another diocese, is the most ancient city Peru, being of the same date with the empire of the Incas, and was founded by them as the capital of the empire. On the mountain contiguous to the north part of the city are the ruins of a famous fort built by the Incas; whence it appears that their design was to inclose the whole mountain with a prodigious wall, of such construction as to render its ascent absolutely impracticable to an enemy, in order to prevent all approach to the city. This wall was entirely of freestone, and strongly built, some of the stones being of a prodigious magnitude. The city of Cusco is nearly equal to that of Lima. See Cusco.

In this bishopric are several mines of gold and silver, that are extremely rich.

The fourth diocese of the audience of Lima is Arequipa, which contains the city of the same name, one of the largest in all Peru. It is delightfully seated in a plain; the houses are well built of stone, and are generally lofty, commodious, finely decorated on the outside, and neatly furnished within. The temperature of the air is extremely agreeable, the cold being never excessive, nor the heat troublesome; so that the fields are always clothed with verdure, and enamelled with flowers, as in a perpetual spring. But these advantages are allayed by its being frequently exposed to dreadful earthquakes; for by these convulsions of nature it has been four times laid in ruins. The city is, however, very populous, and among its inhabitants are many noble families.

In this bishopric are several gold and silver mines, and in some parts are large vineyards, from which considerable quantities of wine and brandy are made. Among the other productions is Guinea pepper, in which the jurisdiction of Africa in this diocese carries on a very advantageous trade, the annual produce of these plantations bringing in no less than 60,000 dollars *per annum*. The pods of this pepper are about a quarter of a yard in length, and when gathered are dried in the sun and packed up in bags of rushes, each bag containing an arbo or a quarter of a hundred weight, and thus they are exported to all parts. Other places of this jurisdiction are famous for vast quantities of large and excellent olives, far exceeding the finest produced in Europe, they being nearly the size of a hen's egg.

The audience of Charcas, the last division of Peru, is equal in extent to that of Lima; but many of its parts are not so well inhabited, some being full of vast deserts and impenetrable forests, while others have extensive plains intercepted by the stupendous height of the Cordilleras: the country is inhabited only in such parts as are free from those inconveniences. It is bounded on the north by the diocese of Cusco, and reaches southward to Buenos Ayres; on the east it extends to Brasil; and on the west it reaches to the Pacific Ocean, particularly at Atacama. The remainder of the province borders on the kingdom of Chili.

This audience is divided into the archbishopric of Plata, and five bishoprics. We shall begin with the former.

The famous mountain of Potosi is known all over the commercial world for the immense quantity of silver it has produced. The discovery of this amazing treasure happened at the commencement of the year 1545, by a mere accident, which we shall mention afterwards. At a small distance from it are the hot medicinal baths, called *Don Diego*, whither some resort for health and others for diversion.

At the time when the first conquests were made, when emigrations were most frequent, the country of the Incas had a much greater reputation for riches than New Spain; and, in reality, for a long time much more considerable treasures were brought away from it. The desire of partaking of them must necessarily draw thither, as was really the case, a greater number of Castilians. Though almost all of them went over thither with the hope of returning to their country to enjoy

Divisions
of the au-
dience of
Lima.

60
The au-
dience of
Charcas.

61
Divisions
&c. of the
audience.

62
How the
country
was at first
settled by
the Spaniards.

Peru. enjoy the fortune they might acquire, yet the majority settled in the colony. They were induced to this by the softness of the climate, the salubrity of the air, and the goodness of the provisions. Mexico presented not the same advantages, and did not give them reason to expect so much independence as a land infinitely more remote from the mother-country.

Cusco attracted the conquerors in multitudes. They found this capital built on a ground that was very irregular, and divided into as many quarters as there were provinces in the empire. Each of the inhabitants might follow the usages of his native country; but every body was obliged to conform to the worship established by the founder of the monarchy. There was no edifice that had any grandeur, elegance, or convenience; because the people were ignorant of the first elements of architecture. The magnificence of what they called the *palace of the sovereign, of the princes of the blood, and of the great men of his empire*, consisted in the profusion of the metals that were lavished in decorating them. The temple of the Sun was distinguished above all other edifices; its walls were incrustated or sheathed with gold and silver, ornamented with divers figures, and loaded with the idols of all the nations whom the Incas had enlightened and subdued.

As it was not a solicitude for their own preservation which occupied the Spaniards at first, they had no sooner pillaged the immense riches which had been amassed at Cusco for four centuries, than they went in great numbers in 1534, under the order of Sebastian de Benalcazar, to undertake the destruction of Quito. The other towns and boroughs of the empire were over-run with the same spirit of rapine; and the citizens and the temples were plundered in all parts.

Those of the conquerors, who did not take up their residence in the settlements which they found already formed, built towns on the sea-coasts, where before there were none: for the sterility of the soil had not permitted the Peruvians to multiply much there; and they had not been induced to remove thither from the extremity of their country, because they failed very little. Paiza, Truxillo, Callao, Pisca, and Arica, were the roads which the Spaniards deemed most convenient for the communication they intended to establish among themselves and with the mother-country. The different positions of these new cities determined the degree of their prosperity.

Those which were afterwards built in the inland parts of the country were not erected in regions which presented a fertile soil, copious harvests, excellent pastures, a mild and salubrious climate, and all the conveniences of life. These places, which had hitherto been so well cultivated by a numerous and flourishing people, were now totally disregarded. Very soon they exhibited only a deplorable picture of a horrid desert; and this wildness must have been more melancholy and hideous than the dreary aspect of the earth before the origin of societies. The traveller, who was led by accident or curiosity into these desolate plains, could not forbear abhorring the barbarous and bloody authors of such devastations, while he reflected that it was not owing even to the cruel illusions of glory, and to the fanaticism of conquest, but to the stupid and abject desire of gold, that they had sacrificed so much more real treasure, and so numerous a population.

This insatiable thirst of gold, which neither tended to subsistence, safety, nor policy, was the only motive for establishing new settlements, some of which have been kept up, while several have decayed, and others have been formed in their stead. The fate of them all has corresponded with the discovery, progress, or declension, of the mines to which they were subordinate.

Fewer errors have been committed in the means of procuring provisions. The natives had hitherto lived hardly on any thing else; but maize, fruits, and pulse, for which they had used no other seasoning except salt and pimento. Their liquors, which were made from different roots, were more diversified: of these the *chicha* was the most usual; but the conquerors were not satisfied either with the liquors or with the food of the people they had subdued. They imported vines from the Old World, which soon multiplied sufficiently in the sands of the coasts at Ica, Pisca, Nasca, Moquegua, and Truxillo, to furnish the colony with the wine and brandy it wanted. Olives succeeded still better; and yielded a great abundance of oil, which was much superior to that of the mother-country. Other fruits were transplanted with the same success. Sugar succeeds so well, that none of any other growth can be compared to that which is cultivated in those parts, where it never rains. In the inland country wheat and barley were sown; and at length all the European quadrupeds were soon found grazing at the foot of the mountains.

This was a considerable step; but there still remained much more to be done. After they had provided for a better and a greater choice of subsistence, the next care of the Spaniards was to have a dress more commodious and more agreeable than that of the Peruvians. These were, however, better clothed than any other American nation. They owed this superiority to the advantage which they alone possessed, of having the LAMA and PACOS, domestic animals which served them for this use. See CAMELUS.

After the conquest, all the Indians were obliged to wear clothes. As the oppression under which they groaned did not allow them to exercise their former industry, they contented themselves with the coarser cloths of Europe, for which they were made to pay an exorbitant price. When the gold and silver which had escaped the rapacity of the conquerors were exhausted, they thought of re-establishing their national manufactures. These were some time after prohibited, on account of the deficiency which they occasioned in the exports of the mother-country. The impossibility which the Peruvians found of purchasing foreign stuffs and paying their taxes, occasioned permission to be given at the end of ten years for their re-establishment. They have not been discontinued since that time; and have been brought to as great a degree of perfection as it was possible they could be under a continual tyranny.

With the wool of the vicuña, a species of wild paracas, they make, at Cusco and in its territory, stockings, handkerchiefs, and scarfs. These manufactures would have been multiplied, if the spirit of distraction had not fallen on animals as well as on men. The same wool, mixed with that of the sheep imported thither from Europe, which have exceedingly degenerated,

Peru.

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Manner of
living of
the natives.

64

Manufactures, &c.

Peru. serves for carpets, and makes also tolerably fine cloth. Pieces of inferior quality are employed in ferges, druggs, and in all kinds of coarse stuffs.

The manufactures subservient to luxury are established at Arequipa, Cusco, and Lima. In these three towns is made a prodigious number of gold toys and plate, for the use of private persons, and also for the churches. All these manufactures are but coarsely wrought, and mixed with a great deal of copper. We seldom discover more taste in their gold and silver laces and embroideries which their manufactures also produce. This is not altogether the case in regard to their lace, which, when mixed with that of Europe, looks very beautiful. This last manufacture is commonly in the hands of the nuns, who employ in it the Peruvian girls, and the young Mestees of the towns, who for the most part before marriage pass some years in the convent.

Other hands are employed in painting and gilding leather for rooms, in making with wood and ivory pieces of inlaid work and sculpture, and in drawing figures on the marble that is found at Cuzco, or on linen imported from Europe. These different works, which are almost all manufactured at Cusco, serve for ornaments for houses, palaces, and temples: the drawing of them is not bad, but the colours are neither exact nor permanent. If the Indians, who invent nothing, but are excellent imitators, had able masters and excellent models, they would at least make good copyists. At the close of the last century, some works of a Peruvian painter, named *Michael de St Jacques*, were brought to Rome; and the connoisseurs discovered marks of genius in them.

Though the Peruvians were unacquainted with coin, they knew the use of gold and silver; for they employed them in different kinds of ornaments. Independent of what the torrents and accident procured them of these metals, some mines had been opened of little depth. The Spaniards have not transmitted to us the manner in which these rich productions were drawn from the bosom of the earth. Their pride, which has deprived us of so much useful knowledge, undoubtedly made them think, that, in the inventions of a people whom they called *barbarous*, there was nothing that was worthy to be recorded.

The difference as to the manner in which the Peruvians worked their mines, did not extend to the mines themselves. The conquerors opened them on all sides. At first the gold mines tempted the avarice of the greater number. Fatal experience discouraged those whom passion had not blinded. They clearly saw, that, for some enormous fortunes raised in this manner, great numbers, who had only moderate fortunes, were totally ruined. These mines sunk into such discredit, that, in order to prevent them from being abandoned, the government was obliged to take the 20th part of their produce, instead of the fifth which it at first received.

The mines of silver were more common, more equal, and richer. They even produced silver of a singular species, rarely found elsewhere. Towards the sea-coast, great lumps of this metal are found in the sands.

There are a great number of other mines which are infinitely more important, and are found in the rocks

and on the mountains. Several of them gave false hopes. Such, in particular, was that of Ucutaya, discovered in 1713. This was only an imitation of almost massive silver, which at first yielded several millions, but was soon exhausted.

Others which were deeper have been alike deserted. Their produce, though equal to what it was originally, was not sufficient to support the expence of working them, which augmented every day. The mines of Quito, Cusco, and Arequipa, have experienced that revolution which awaits many of the rest.

There are greater numbers of very rich mines which the waters have invaded. The disposition of the ground, which from the summit of the Cordilleras goes continually shelving to the South Sea, must necessarily render these events more common at Peru than in other places. This inconvenience, which with greater care and skill might often have been prevented or diminished, has been in some instances remedied.

Joseph Salcedo, about the year 1660, had discovered, not far from the town of Puna, the mine of Laycaca. It was so rich, that they often cut the silver with a chisel. Prosperity had so elevated the mind of the proprietor, that he permitted all the Spaniards who came to seek their fortune in this part of the New World, to work some days on their own account, without weighing or taking any account of the presents he made them. This generosity drew around him an infinite number of people, whose avidity made them quarrel with each other, and the love of money made them take up arms and fall upon one another; and their benefactor, who had neglected no expedient to prevent and extinguish their sanguinary contentions, was hanged as being the author of them. Whilst he was in prison, the water got possession of his mine. Superstition soon made it imagined that this was a punishment for the horrid act they had perpetrated against him. This idea of divine vengeance was revered for a long time; but at last, in 1740, Diego de Bacna associated with other opulent people to avert the springs which had deluged so much treasure. The labours which this difficult undertaking required, were not finished till 1754. The mine yields as much now as it did at first. But mines still richer than this have been discovered. Such, for example, is that of Potosi, which was found in the same country where the Incas worked that of Porco.

An Indian, named *Hualpa*, in 1545, pursuing some deer, in order to climb certain steep rocks laid hold of a bush, the roots of which loosened from the earth, and brought to view an ingot of silver. The Indian had recourse to it for his own use; and never failed to return to his treasure every time that his wants or his desires solicited him to it. The change that had happened in his fortune was remarked by one of his countrymen, and he discovered to him the secret. The two friends could not keep their counsel and enjoy their good fortune. They quarrelled; on which the indolent confident discovered the whole to his master, Villaroell, a Spaniard who was settled in the neighbourhood. Upon this the mine became known, and was worked; and a great number of them were found in its vicinity; the principal of which are in the northern part of the mountain, and their direction is from north to south. The most intelligent people of Peru have observed,

observed, that this is in general the direction of the richest mines.

The same of what was passing at Potosi soon spread abroad; and there was quickly built at the foot of the mountain a town, consisting of 60,000 Indians and 10,000 Spaniards. The sterility of the soil did not prevent its being immediately peopled. Corn, fruit, flocks, American stuffs, European luxuries, arrived there from every quarter. Industry, which everywhere follows the current of money, could not search for it with so much success as at its source. It evidently appeared that in 1738 these mines produced annually near 975,000 l. without reckoning the silver which was not registered, and what had been carried off by fraud. From that time the produce has been so much diminished, that no more than one-eighth part of the coin which was formerly struck is now made.

At the mines of Potosi, and all the mines of South America, the Spaniards, in purifying their gold and silver, use mercury, with which they are supplied from Guanã Velica. The common opinion is, that this mine was discovered in 1564. The trade of mercury was then still free: it became an exclusive trade in 1571. At this period all the mines of mercury were shut; and that of Guanã Velica alone was worked, the property of which the king reserved to himself. It is not found to diminish. This mine is dug in a prodigiously large mountain, 60 leagues from Lima. In its profound abysses are seen streets, squares, and a chapel, where the mysteries of religion on all festivals are celebrated. Millions of flambeaux are continually kept to enlighten it.

Private people at their own expence work the mine of Guanã Velica. They are obliged to deliver to government, at a stipulated price, all the mercury they extract from it. As soon as they have procured the quantity which the demands of one year require, the work is suspended. Part of the mercury is sold on the spot, and the rest is sent to the royal magazines throughout all Peru; from whence it is delivered out at the same price it is sold for in Mexico. This arrangement, which has occasioned many of the mines to drop, and prevented others from being opened, is inexcusable in the Spanish system. The court of Madrid, in this respect, merits the same reproaches as a ministry in other countries would incur, that would be blind enough to lay a duty on the implements of agriculture.

The mine of Guanã Velica generally affects those who work in it with convulsions: this and the other mines, which are not less unhealthy, are all worked by the Peruvians. These unfortunate victims of an insatiable avarice are crowded all together and plunged naked into these abysses, the greatest part of which are deep, and all excessively cold. Tyranny has invented this refinement in cruelty, to render it impossible for any thing to escape its restless vigilance. If there are any wretches who long survive such barbarity, it is the use of cocoa that preserves them.

In the Cordilleras, near the city of Paz, is a mountain of remarkable height, called *Illimani*, which doubtless contains immense riches; for a crag of it being some years ago seared by a flash of lightning, and falling on a neighbouring mountain, such a quantity of gold was found in the fragments, that for some time that

metal was sold at Paz for eight pieces of eight *per ounce*; but its summit being perpetually covered with ice and snow, no mine has been opened in the mountain.

The city of La Paz is of a middling size, and from its situation among the breaches of the Cordilleras, the ground on which it stands is unequal, and it is also surrounded by mountains. When the river Titicaca is increased, either by the rains, or the melting of the snow on the mountains, its current forces along large masses of rocks with some grains of gold, which are found after the flood has subsided. Hence some idea may be formed of the riches inclosed in the bowels of these mountains; a remarkable proof of which appeared in the year 1730, when an Indian, washing his feet in the river, discovered so large a lump of gold, that the marquis de Cattle Fuerte gave twelve thousand pieces of eight for it, and sent it as a present to the king of Spain.

Bajim of PERU. See MYROTILOM.

PERUGIA, a town of Italy, in the pope's territories, and capital of Perugia. It is an ancient, handsome, populous, and large city, with a strong citadel, an university, and a bishop's see. The churches, and many other buildings as well public as private, are very handsome. It is seated on a hill, in E. Long. 12. 30. N. Lat. 43. 6.

PERUGINO, a province of Italy, in the territory of the church, bounded on the west by Tuscany, on the south by Orvieto, on the east by the duchies of Spoleto and Urbino, and on the north by the county of Citta Castellana. It is one of the smallest provinces in the territory of the church. The air is very pure, and the soil fertile in corn and good wine; besides, the lake Perugia supplies them with plenty of fish. The capital town is Perugia. The lake is eight miles from the city, and is almost round, being about five miles in diameter; in it there are three islands. This province is about 25 miles in length, and near as much in breadth.

PERUGINO. See MONTANINI.

PERUKE. See PERRUKE.

PERUVIAN BARK. See CINCHONA, and *JASUITS Bark*.

PERUVIANA, a general name given to that vast peninsula, extending itself from the isthmus of Darien to Cape Horn, in the form of a triangle, of which the *Terra Magellanica* and the Cape form the vertex. It includes the whole of South America, although, as is well known, all the countries included within these limits do not acknowledge the dominion of the crown of Spain. See *TERRA FIRMA*.

PESARO, a town of Italy, in the territory of the pope, and duchy of Urbino, with a bishop's see. It is a large place, whose streets are paved with bricks. The castle is very well fortified, the harbour excellent, and the cathedral church magnificent. The environs are remarkable for producing good figs, of which they send large quantities to Venice. It is seated on an eminence at the mouth of the river Fogha, on the Gulph of Venice. E. Long. 13. 0. N. Lat. 43. 56.

PESCARA, a very strong town in the kingdom of Naples, and in the latter Abruzzo; seated at the mouth of a river of the same name, which falls into the

Peru
Pescara.

Pescenius the Gulph of Venice. E. Long. 15. 2. N. Lat.

Petalism 42. 27.

PESCENIUS NIGER. See **NIGER.**

PESCHIERA, a small but strong town of Italy, in the Veronese, with a castle, and a strong fort; seated on the river Mincio, or Menzo, which proceeds from the lake Garda. E. Long. 11. 4. N. Lat. 45. 27.

PESNAS, an ancient town of France, in Languedoc, and in the diocese of Agde; delightfully seated on the river Pein, 12 miles north-east of Béziers, and eight north of Agde. E. Long. 3. 34. N. Lat. 43. 28.

PESSARY, in medicine, a solid substance composed of wool, lint, or linen, mixed with powder, oil, wax, &c. made round and long like a finger, in order to be introduced into the exterior neck of the matrix, for the cure of several uterine disorders.

PEST, a town of Upper Hungary, and capital of a county of the same name, seated on the Danube, in a fine plain, over-against Buda, 85 miles south-east of Presburg. E. Long. 18. 25. N. Lat. 47. 24.

PESTILENCE, in medicine, the same with the **PLAGUE**.

PETAGUEL, a territory of South America, in Brasil, bounded on the north by Dele; on the east by the sea; on the south by the captainship of Rio-Grande; and on the west by Tupuys. It contains mines of silver.

PETAL, in botany, one of the coloured leaves which compose the flower.

PETALISM, a mode of deciding on the guilt of citizens similar to the Athenian **OSTRACISM**. It was introduced in Syracuse about the year before Christ 460, in order to prevent the tyranny of the richer citizens, who had often about that time aimed at the diadem. To prevent, therefore, the evils daily arising from thence, and to bring down the aspiring minds of the wealthy citizens, the Syracusans were forced to make a law not unlike that of the Athenian ostracism; for as at Athens every citizen was to write on a shell the name of the person whom they conceived to be the most likely, on account of his wealth and adherents, to aspire to the crown; so at Syracuse they were to write on a leaf the names of such as they apprehended powerful enough to usurp the sovereignty. When the leaves were counted, he who had the most suffrages against him was, without any farther inquiry, banished for five years. This new-contrived method of impairing the estates, and weakening the interest of the overgrown citizens, was called *petalism*, from the Greek word *petalon*, which signifies "a leaf." This law was attended with many evil consequences; for those who were most capable of governing the commonwealth were driven out, and the administration of public affairs committed to the meanest of the people; nay, many of the chief citizens, who were able to render their country great service, fearing to fall under penalties of this law, withdrew from the city, and lived private in the country, not concerning themselves with public affairs: whence all the employments being filled with men of no merit or experience, the republic was on the brink of ruin, and ready to fall into a state of anarchy and confusion. The law therefore of petalism, upon more mature deliberation, was repealed soon after it had been first

enacted, and the reins of government were again put into the hands of men who knew how to manage them.

PETARD, in the art of war. See **GUNNERY**, no 56, and Plate CCXXIV.

PETAU (Denis), or *Dionysius PETAVIUS*, a French Jesuit of great erudition, born at Orleans in 1583. His father was a man of literature, and observing strong parts and an excellent genius for letters in his son, he took every means in his power to improve them. He used to tell his son, that he ought to qualify himself so, as to be able to attack and confound "the giant of the Allophylæ;" meaning that most eminent scholar Joseph Scaliger, whose abilities and learning were allowed to have done great honour and much service to the reformed. Young Petavius seems to have entered readily into his father's views; for he studied most intensely, and afterwards levelled much of his erudition against Scaliger. He joined the study of the mathematics to that of the belles lettres; and afterwards applied himself to a course of philosophy, which he began in the college of Orleans, and finished at Paris. He afterwards maintained theses in Greek, which was as familiar to him as Latin; and the Latin, it is said, he understood better than he did his own native language. When he was pretty well advanced, he had free access to the king's library, which he often visited on account of the Latin and Greek manuscripts. Among other advantages which accompanied his literary pursuits, was the friendship of Isaac Casaubon, whom Henry IV. called to Paris in 1600. It was at Casaubon's instigation, that Petavius, though then but very young, undertook an edition of The Works of Synesius. In this edition he corrected the Greek from the manuscripts, translated that part which yet remained to be translated into Latin, and wrote notes upon the whole. He was but 19 years of age when he was made professor of philosophy in the university of Bourges; and he spent the two following years in studying the ancient philosophers and mathematicians. In 1604, when Morel, professor of Greek at Paris, published The Works of Chrysostom, some part of Petavius's labours on Synesius were added to them: from the title of which we learn, that he then took the name of *Patus*, which he afterwards changed into *Petavius*. His own edition of The Works of Synesius did not appear till 1612.

He entered into the society of the Jesuits in 1605, and did great credit to it by his vast and profound erudition. He became a zealous advocate for the church of Rome; and there was no way of serving it more agreeable to him than that of criticising and abusing its adversaries. He was most bitter against Scaliger; nor did he even spare his friend Casaubon whenever he came in his way.—Petavius excelled particularly in the dark science of chronology; the learned world in general being obliged to him for some exact and nice disquisitions on this subject. His chief work, which is in great repute to this day, he intitled, *Rationarium Temporum*. It is an abridgement of universal history, from the earliest times to 1632, in chronological order, with references to proper authorities. It was improved, and several additions made to it, by Perizonius, and others after his death. This eminent father, after a very laborious life, died at Paris in the end of the year

Petard
Petau.

year 1652, aged 69. Cassendus, in his life of Perefchius, says he was the most consummate scholar the Jesuits ever had; an opinion very likely to be true, when we consider that he often contended successfully with Scaliger, Salmasius, and others, whose abilities have been universally acknowledged. His judgment, however, was not equal to his erudition, and his controversial writings are full of sourness and spleen. We have the following character of a great work of Petavius by an author of much celebrity, but who perhaps is as much biassed on the side of infidelity as he thinks this learned Jesuit was in favour of the church of Rome. The *Dogmatic Theologia* of Petavius is a work of incredible labour and compass: the volumes which relate solely to the incarnation (two folios, 5th and 6th, of 837 pages) are divided into 16 books—the first of his history, the remainder of controversy and doctrine. The Jesuit's learning is copious and correct; his Latinity is pure, his method clear, his argument profound and well connected: but he is the slave of the fathers, the scourge of heretics, and the enemy of truth and candour, as often as they are inimical to the Catholic cause.

PETAW, an ancient town of Germany, in the circle of Austria, and in Stiria. It is a handsome place, and is seated on the river Drave, 35 miles north-east of Cilley, and 109 south of Vienna. E. Long. 15. 36. N. Lat. 46. 40.

PETCHELI, a province of Asia, in China, and the chief in the whole empire; bounded on the east by the sea, on the north by the great wall, on the west by Chanfi, and on the south by Chantong and Honan. "This province contains nine cities of the first class, which have several others under their jurisdiction; these are about 40 in number, less considerable indeed, but all surrounded with walls and ditches. Petcheli has few mountains. Its soil is sandy, and produces very little rice; but all other kinds of grain abound there, as well as the greater part of the fruit-trees we have in Europe. It pays an annual tribute to the emperor, which, according to Father Martini, consists of 651,153 bags of rice, wheat, and millet; 224 pounds of linseed; 45,135 of spun silk; 13,748 of cotton; 8,737,248 trusses of straw for the horses belonging to the court, and 180,870 measures of salt, each containing 124 pounds; which is proportionably much inferior to that paid by other provinces.

"It is remarked that the people of this province have not the same aptitude for acquiring the sciences as those who inhabit the southern provinces of the empire; but they are more robust and warlike, and better calculated to endure the hardships and fatigue of war. This is the case with the Chinese of all the other northern countries.

"The face of the country here being flat and level, permits the use of a kind of carriage, the construction of which appears to be rather singular. Father Martini, one of the first missionaries in China, thus describes it: 'They use, in the province of Petcheli, a kind of chariot with one wheel, and constructed in such a manner, that there is room in the middle for only one person, who sits as if on horseback; the driver pushes behind, and, by means of wooden levers, makes the chariot advance with safety and expedition.

This has perhaps given rise to the report of chariots driven in that country by the wind, which the Chinese direct over land with sails, as they do ships at sea.' A French missionary, who traversed this province in 1768, seems to have made use of the same kind of carriage. 'We quitted the canal (says he) to travel in carts, which is customary in this part of China; but it is disagreeable beyond description. The cart is amazingly clumsy, and has a great resemblance to the carriage of a gun: there is room in it for only one person, who is frequently obliged to sit cross-legged, as our taylors do in Europe; it jolts prodigiously; and, while the traveller is exposed to the scorching rays of the sun, such clouds of dust sometimes arise as almost suffocate him.'

"The temperature of the air of this province does not seem to agree with its latitude. Although Petcheli extends no farther than to the 42d degree of north latitude, yet all the rivers there are so much frozen during four months in the year, that horses and waggons with the heaviest loads may safely pass them. It deserves to be remarked, that the whole body of ice is formed in one day, and that several are necessary to thaw only the surface. What may appear no less extraordinary is, that during these severe frosts one does not feel that sharp and pinching cold which accompanies the production of ice in Europe. These phenomena cannot be accounted for, but by attributing them to the great quantity of nitre which is found dispersed throughout this province, and to the serenity of the sky, which, even during winter, is seldom obscured by a cloud. The physical explanation, which we have given of this singular temperature, is fully confirmed by experiments lately made by Father Amiot at Peking, which convinced him, that in this capital and neighbourhood, as far as seven or eight leagues around, the water, air, and earth, equally abound with nitre.

"With regard to the water, the facility with which it freezes, the solidity of the ice and its duration, evidently announce the presence of nitre. A tub filled with water, placed near one of Rheumur's thermometers, had its surface immediately frozen, when the mercury stood only one degree above the freezing point; and when it stood three degrees below freezing, the water became a solid mass of ice, if the diameter of the vessel did not exceed a foot and a half, and the depth of the water four or five inches. This water, when the weather was fine, continued in the same state of congelation as long as the mercury in the thermometer did not rise higher than three degrees above 0; when the mercury rose higher, it then began to dissolve, but so slowly, that two or three days were scarcely sufficient to restore it to its former fluidity." Grosier goes on to relate other experiments of Father Amiot, which were made with a view to discover the cause of the water's freezing so in this temperate climate; and he then proceeds to tell us, that "if the waters of the province of Petcheli contain much nitre, it is no less certain, that the air which one breathes there is abundantly impregnated with it. The following are indubitable proofs of it: 1st, Notwithstanding unwholesome food, such as the flesh of the greater part of domestic animals that have died of old age or disease, which the people of this province

Petcheli.

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greedily devour, notwithstanding filth and all the inconveniences resulting from low, damp, and confined lodgings, where all the individuals of the same family are, as it were, heaped one upon another. the plague never makes its appearance in Petcheli; and the people are seldom attacked by any of those epidemical distempers which are so common in Europe. 2dly, Provisions of every kind may be kept at Peking a long while, without being subject to corruption. Rats are eaten there fresh even in May, apples and pears till midsummer; wild boars, stags, deer, roebucks, rabbits, larks, pheasants, ducks, geese, and all kinds of game brought from Tartary to Peking after the commencement of winter; fish of every species, transported from the rivers of Leaotong—will keep without the assistance of salt, in their state of congelation, for two or three months, although they are exposed every day in the markets, carried from the markets to private houses, and from private houses brought back to the markets until they are all sold, which does not happen before the end of March. It is certain, that these facts announce an antiseptic quality in the air, which must undoubtedly proceed from the great quantity of nitre contained in it.

3dly, The earth which forms the soil of Petcheli abounds no less with nitre; whole fields may be seen in the neighbourhood of Peking which are covered with it. Every morning at sunrise the country in certain cantons appears as white as if sprinkled by a gentle fall of snow. If a quantity of this substance be swept together, a great deal of kien, nitre, and salt, may be extracted from it. The Chinese pretend, that this salt may be substituted for common salt; however this may be, it is certain, that, in the extremity of the province towards Siuen-hoa-fou, poor people and the greater part of the peasants make use of no other. With regard to the kien procured from the earth, they use it for washing linen, as we do soap. Although the land of Petcheli is replete with nitrous particles, it does not, however, form dry deserts; it is cultivated with care, and becomes fruitful by incessant labour. The earth is frozen in winter to the depth of two or three feet, and does not become soft before the end of March. This may sufficiently explain why the frost kills plants in the neighbourhood of Peking, which Mr Linnæus raised in Sweden, although it is 20 degrees farther north than the capital of the Chinese empire."

PETECHIE, in medicine, a name given to those spots, whether red or of any other colour, which appear in malignant fevers.

PETELIA. See STRONGOLI.

PETER (St), the apostle, born at Bethsaida, was son of John, Jona, or Joanna, and brother of St Andrew (John i. 42, 43.) His first name was Simon or Simeon; but when our Saviour called him to the apostleship, he changed his name into Cephas, that is, in Syriac, a stone or a rock; in Latin, *petra*, whence *Peter*. He was a married man; and had his house, his mother-in-law, and his wife, at Capernaum, upon the lake of Genneareth (Mark i. 29. Mat. viii. 14. Luke iv. 38.) St Andrew, having been first called by Jesus Christ, met his brother Simon, and told him (John i. 41.) we have found the Messiah, and then brought him to Jesus. Jesus beholding him, said to

him, You are Simon son of Jona; henceforth you shall be called *Cephas*, that is, *stone* or *rock*. After having passed one day with our Saviour, they returned to their ordinary occupation, which was fishing. Yet it is thought they were present with him at the marriage of Cana in Galilee. This happened in the 32th year of the vulgar Christian era.

Towards the end of the same year, Jesus Christ being on the shore of the lake of Genneareth, saw Peter and Andrew busy about their fishery, and washing their nets (Luke v. 1, 2, 3.) He entered into their boat, and bid Peter throw out his nets into the sea, in order to fish. Peter obeyed him, though he had already fished the whole night without catching any thing. They took so many fishes at this draught, that their own vessel, and that of James and John sons of Zebedee, were filled with them. Then Peter threw himself at the feet of Jesus, and said to him, Depart from me, Lord, for I am a sinner. Then Jesus said to them, Follow me, and I will make you fishers of men. He said the same thing to James and John; and immediately they quitted their boats and nets, and followed our Saviour.

Some time after, Jesus coming to Capernaum entered into the house of St Peter, where his mother-in-law lay sick of a fever. He immediately healed her, and she began to minister to him (Luke iv. 38. and Mat. viii. 14.) A little while before the feast of the passover of the following year, being the 32d of the vulgar era, after Jesus returned into Galilee, he made choice of twelve apostles, among which St Peter has always the first place (Mat. x. 2. Luke vi. 13.) One night that Jesus Christ walked upon the waters of the lake of Genneareth, St Peter asked him leave to come and meet him (Mat. xiv. 28, 29.) Jesus gave him leave; but he seeing a great wave coming, was afraid, and therefore began to sink. Then Jesus held him up, and said, O man of little faith, why was you afraid? Afterwards landing on the other side of the lake, and the multitude that he had fed the day before beyond the lake being come to him at Capernaum, he spoke to them of his body and of his blood which he was to give to his disciples to eat and drink. This so offended the multitude, that several of them quitted him thereupon. He therefore asked his apostles if they also would leave him; to which Peter replied, To whom shall we go, Lord; for thou hast the words of eternal life (John vi. 53, 54, &c.) One day, as our Saviour was near Cæsarea Philippi, he asked his apostles whom the world took him for? they answered, that some said he was John the Baptist; others, Elias; and others Jeremiah, or one of the prophets. But whom do you say I am? says Jesus Christ. Simon Peter answered, Thou art Christ, the son of the living God. Jesus then said unto Peter, Blessed art thou, Simon Barjona; for flesh and blood hath not revealed it unto thee, but my father which is in heaven (Mat. xvi. 13, 14, &c.) And I say unto thee, that, as thou art Peter, so upon this rock will I build my church, and the gates of hell shall not prevail against it; and I will give unto thee the keys of the kingdom of heaven, and whatsoever thou shalt bind on earth shall be bound in heaven, and whatsoever thou shalt loose upon earth shall be loosed in heaven. About six or eight days after this, our Saviour taking Peter, James, and John,

up a high mountain, apart from the other disciples, showed them a glimpse of his glory, and was transfigured before them (Mat. xvii. 1, 2, &c. and Luke ix. 28.) Whereupon Peter, seeing Moses and Elias together with Jesus, cried out to them in an ecstasy, Lord, it is good for us to be here! if you please, we will make three tents; one for you, one for Moses, and one for Elias.

Jesus returning from thence to Capernaum, those that gathered the tribute-money came to Peter, and said, Does not your master pay tribute? Whereupon Jesus ordered Peter to throw his line into the sea, and that he should find wherewith to pay the toll for them two in the mouth of the first fish he should take. Peter obeyed; and finding a piece of money in the mouth of the fish, he gave it to the tribute-masters, as he was directed. One day, as Jesus was discoursing concerning the forgiveness of injuries (Mat. xviii. 21, 22.), St Peter asked him, how often they must forgive, and whether it was sufficient to pardon an offender seven times? Jesus told him, I say, you must pardon not only as far as seven times, but even seventy times seven. Upon another occasion (Mat. xix. 27—29), as our Saviour was speaking of the danger of riches, Peter said to him, Lord, we have left all things to follow thee; what reward shall we have for it? Jesus answered him, I tell you in truth, that you who have left all things to follow me shall receive an hundred fold even in this world, and in the other eternal life; and at the last day, when the Son of man shall come to judge the world, you shall sit upon twelve thrones to judge the twelve tribes of Israel.

On the Tuesday before our Saviour's passion, Peter showed him the fig-tree he had cursed the evening before, which was now dried up and withered (Mark xi. 12—14.); and the day following, as they sat upon the mountain of Olives, he, with the other apostles, asked Jesus when the temple was to be destroyed (Mat. xxiv. 1, 2, &c. Mark xiii. 1, 2, &c. Luke xxii.) On Thursday he was sent with St John to prepare all things for the passover; and at evening, when Jesus was come into the city with his apostles, and, being set down at table, began to speak of him that should betray him, Peter made signs to John to ask him who this should be (John xvi. 24.) After supper, the disciples entered into a dispute which should be the greatest among them: whereupon Jesus Christ, laying aside his garments, betook himself to wash their feet, to give them an example of humility in his own person. St Peter at first made some difficulty, and would not suffer his master to wash his feet: but Jesus telling him, that if he did not wash his feet, he could have no part in him; St Peter replied, Lord, wash not only my feet, but my hands and head also (John xiii. 6—10.)

Some time after, Jesus said to him (Luke xxii. 31, 32. &c.), Peter, Satan has desired to sift you as wheat; but I have prayed for you, that your faith may not fail: and when you are converted, confirm your brethren. By this he warned St Peter of his fall, that was just at hand, and of his renouncing him; from which, by the assistance of God, he was afterwards to recover. St Peter then asked him, where he was going? and told, he was ready to follow him everywhere,

not only to prison, but to death itself. But Christ declared to him, that he would be so far from following him to death that he would adjure him three times that very night before the cock should crow, or before break of day. When supper was ended, he went to the garden of Olives, where, taking Peter, James, and John, he went with them apart, that they might be witnesses of his agony. Peter, though he could be had showed so much resolution, yet he fell asleep; which occasioned Jesus to say to him, Dost thou sleep, Simon? Could you not watch with me one hour? (Mark xiv. 37. Mat. xxvi. 40, &c.)

Jesus being come with the soldiers to seize Jesus, Peter drew his sword, and cut off the right ear of one called Malchus, who was servant to the high-priest: but Jesus bid him put up his sword into the scabbard; and told him, that all those that fought with the sword should perish by the sword: and at the same time healed Malchus's ear (John xvi. 17, &c.) Peter followed Jesus afar off as far as the house of Caiaphas, and was let in by means of another disciple, who was known in the family. The soldiers and servants that had brought Jesus, having lighted a fire in the middle of the hall, Peter mingled among them to warm himself also; when a maid servant, having looked earnestly upon him, said, Surely this man was with Jesus of Nazareth. But Peter made answer, I know not what you say, for I do not so much as know the man. Presently after he went out into the porch, when immediately the cock crew. A little while after another maid said to those that were present, This man was with Jesus of Nazareth. But Peter denied it with an oath. About an hour after, one of the company affirmed that Peter was a disciple of Jesus. Others insisted upon the same thing; and said, that surely he was one of them, for his very speech betrayed him to be a Galilean. Lastly, one of them, being a kinsman of Malchus whose ear Peter had cut off, affirmed the same thing; and asked him, Did not I see you with him in the garden? Peter again denied it with an oath, protesting that he did not know the man. And at the same time the cock crewed the second time. Then Jesus, being in the same hall, and not far from Peter, looked upon him; and Peter then remembering what Jesus had said to him, that before cock crew he should deny him thrice, he went out of Caiaphas's house, and went bitterly (Mat. xxvi. 73, 74. Mark xv. 34, 35.)

Very probably he remained, in secret, and in tears, all the time of our Saviour's passion, that is, all Friday and Saturday following; but on Sunday morning, Jesus being risen, and Mary having been at the tomb, and not finding the body of Jesus, she came in haste into the city, to tell Peter and John that they had taken away their master, and that she could not find where they had put him. Peter and John made haste thither, and John coming first, did not go into the sepulchre. Peter then coming up to him, presently stooped down, and saw the linen clothes wherein the body had been wrapt. He went then into the sepulchre, and John with him; after which they returned to Jerusalem, not knowing what had come to pass. But soon after Jesus appeared to the holy women, who had come first to the sepulchre, and had then given his apostles notice of his resurrection. And the same day

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our Saviour also appeared to Peter, to comfort him, and assure him that his repentance had been acceptable to him.

Some days after, St Peter being returned into Galilee as Jesus had commanded him, and going to fish in the sea of Galilee, or in the lake of Gennesareth, with some other of the apostles, Jesus appeared to them on the shore, and bid them throw out their nets on the right side of the vessel. They threw them out, and took such a multitude of fishes that they could not draw up their nets again. Then St John said to Peter, It is the Lord. Peter immediately girded up himself, for he was naked, and swimming to shore he came to Jesus: then drawing their nets to shore, Jesus dined with them. After dinner, Jesus said to Peter, Simon, son of Jona, do you love me more than these? He answered, Yea, Lord, you know that I love you. Jesus says to him, Then feed my lambs. He put the same question to him again; and Peter making the same answer, our Lord said to him again, Feed my sheep. This he repeated a third time; at which St Peter was troubled, and said, You know, Lord, that I love you. Jesus replied to him, "Feed my sheep. I tell you for a truth, that when you were young, you girded yourself and went where you pleased; but now you are old, another shall gird you, and lead you where you would not go." This he said to let him know what death he was to die. At the same time, Peter seeing St John the Evangelist, said to our Saviour, Lord, what must become of him? Jesus answered, "If I will that he tarry till I come, what does that concern you? Do you follow me." Thus he refused to declare in what manner St John should end his life.

After that Jesus Christ had ascended into heaven, and that the apostles had been witnesses of his ascension, they returned to Jerusalem, to wait there for the Holy Ghost, whom our Saviour had promised to send them; and being assembled together in a house, they continued there in prayer, and in the union of charity, till the time that the Holy Ghost descended upon them, in the form of tongues of fire. During this interval, St Peter proposed to the apostles, and to the rest of the assembly, to fill up the place that the traitor Judas had left vacant in the apostleship. The proposal was agreed to by all; and two persons were proposed, Joseph Barsabas and Matthias: upon this last the lot fell; and from that time he was admitted one of the apostles. The tenth day after the ascension of our Saviour, being the day of Pentecost, the Holy Ghost having descended upon the apostles, and upon all the faithful that were assembled with them, and having replenished them with supernatural gifts, and especially with the gift of tongues, all those who were witnesses of this miracle expressed their admiration at it; and there being upon that day at Jerusalem a great many Jews from several provinces of the east, they could not comprehend by what means these men, who were Galileans, should speak the languages of all these pagan nations (Acts ii. 1, 2, &c.) Some of them said, that the apostles were full of new wine. But St Peter standing up, told them, that what they heard and saw was not the effect of drunkenness, but was the completion of the promise that the Holy Ghost had made by the prophet Joel (ii. 28.), to send his spirit upon all flesh, and to give the spirit of prophecy to young and

old, to men and women. He afterwards spoke to them of Jesus Christ, and told them that he was the true Messiah, that he was risen from the dead as the scripture had foretold he should; declaring that himself and the other apostles were witnesses of his resurrection; of his ascension into heaven, and of the mission of the Holy Ghost, the visible effects of which they saw with their own eyes in the gifts of languages wherewith they had been replenished.

Then those that heard him were touched with compunction, and asked the apostles, Brethren, what shall we do? Peter answered them, Repent, and be baptized, and you shall receive the Holy Ghost. Then he instructed them, baptized them, and that very day three thousand persons were added to the church (Acts iii. 1, 2, &c.) Some days after, St Peter and John, going to the temple at the hour of prayers, met at a gate of the temple a man who had been lame from his birth, so that he was carried about. This man seeing Peter and John, asked alms of them; upon which Peter said to him, Silver or gold I have not; but such as I have I give thee: In the name of Jesus of Nazareth, rise up and walk. Presently the man got up, and went into the temple along with them, lifting up his voice, and glorifying God. He held St Peter, telling the people then assembled all that happened unto him. Then Peter, taking this occasion, told the people, that it was not by his own power that he had performed the miracle they so much wondered at, but that it was by the power of Jesus Christ that this man was healed. He then laid before them the great crime they had committed, in putting Jesus Christ to death, who was the Saviour of the world, and the Messiah; and after he had shewn them by all the prophecies that Christ was to die thus, he exhorted them to repentance, and to make a proper use of the death of Christ.

He was thus speaking to the people, when the priests and Sadducees coming upon them, laid hold on Peter and John, and put them in prison, until the day following, it being now late (Acts iv. 1, 2, &c.) But the number of those that were converted this day at the second preaching of St Peter was about five thousand. The day following, the rulers, magistrates, and chief priests being assembled on this occasion, ordered the apostles to be brought before them; and then asked them, by whose authority they performed the miracle of healing the lame man? St Peter answered, that it was in the name of Jesus of Nazareth, whom they had crucified, and whom God raised again from the dead. The assembly were surprised at the boldness of the apostles upon this occasion: but came to a resolution to dismiss them, charging them at the same time to teach no more in the name of Jesus; and threatening them if they should persist in disobedience to these orders. The two apostles returned to their brethren, and related to them all that had passed; which having heard, the brethren raised their voices to heaven, begging God to give them strength and courage to declare his word with perfect liberty; and having finished their prayers, the place shook wherein they were assembled, and they were again filled with the Holy Ghost.

At this time many of the faithful sold their estates, and brought the money to the apostles (*id.* v. 1, 2, &c.) Of this number was a man called Ananias, with

eter. his wife Sapphira, who, by a private agreement between themselves, concealed a part of the money for which they had sold their land, and brought the rest to St Peter, as if it were the whole sum. Ananias came first; and St Peter said to him, Ananias, how came Satan to seduce you, and to prevail with you to lie to the Holy Ghost, by concealing part of the price of your land? It is not men that you thought to impose on, but God. Immediately Ananias fell down dead, and they carried him out and buried him. About three hours after his wife Sapphira came in, and St Peter said to her almost the same things he had before said to her husband, and immediately she fell down also, and gave up the ghost. This affair infused a great awe in the whole church, and amongst all those that heard of it. (See Acts v.)

The number of believers considerably increased every day; so that they even brought out the sick into the streets, and laid them where Peter was to pass, that at least his shadow might cover some of them, by which means they were healed of their distempers. Then the high-priest and his associates, that is, the Pharisees, caused the apostles to be apprehended and put into prison. But an angel brought them forth, and bid them go into the temple, and there boldly declare all the words of life which God had taught them. This they performed: upon which the princes and priests caused them to be brought before them; and having demanded why they had disobeyed their orders, in continuing to speak still in the name of Jesus Christ, Peter and the apostles answered, that it was more necessary to obey God than man. This answer provoked them very much, and they were going to condemn them to death, when Gamaliel prevailed with them to change their resolution, by representing to them, that if this matter proceeded from God, it was in vain for them to oppose it; but if otherwise, then it should soon vanish of itself. So they dismissed the apostles, after giving them thirty-nine stripes a-piece, and charged them to speak no more in the name of Jesus Christ.

After the martyrdom of St Stephen, a persecution was carried on against the faithful at Jerusalem, and they were obliged to take shelter in several places. The apostles alone continued at Jerusalem (Acts viii. 1, 2, 3, &c.) St Philip the deacon going to Samaria, the Samaritans received the word of the Lord, and several of them were baptized. Then St Peter and St John repaired thither also, to give them the Holy Ghost; which St Philip, being only a deacon, had not power to do. Simon the magician was also baptized among others; and admiring the power that the apostles had, of conferring the Holy Ghost, would have bought the same power of the apostles, and accordingly offered money to St Peter. But Peter with indignation replied to him, Thy money and thou perish together, who thinkest the gifts of God can be bought with money! Thou hast no part with us, nor hast any pretensions to this ministry, for thy heart is not right before God. Repent therefore of this wickedness, and pray to God if perhaps he will pardon the wicked thoughts of thy heart. After this Peter and John returned again to Jerusalem. See Acts viii.

The fire of persecution being now pretty well extinguished, St Peter departed from Jerusalem (Acts ix. 32, &c.), and visiting the disciples from city to ci-

ty, he came also to see the saints that dwelt at Lydda. Here he found a man called Æneas, who had been paralytic for eight years. St Peter said to him, Æneas, rise up; Jesus Christ the Lord cures you. He presently got up; and all that dwelt at Lydda that saw the miracle were converted to the Lord. There was also at Joppa a certain holy woman, named Tabitha, who happening to die while St Peter was at Lydda, the disciples sent to desire him to come to them. Whereupon St Peter came, and entering into the chamber where Tabitha lay dead, he caused every body to go out, and betook himself to prayers. Then turning himself towards the corpse, he said, Tabitha, arise. At which instant she opened her eyes, and seeing St Peter, she sat up. This miracle was much famed at Joppa, and was the occasion that many were converted. St Peter stayed there a good while, taking up his lodging with one Simon a tanner.

Now there was at Cæsarea of Palestine a centurion called Cornelius, a man that feared God (Acts x. 1, 2, 3.), and to whom it was revealed by an angel, that he should send to Joppa to Peter, who should tell him what he had to do. Cornelius immediately sent two of his servants; and while they were upon the road, the Lord sent a vision to Peter, to prepare him to go to this man without any scruple, although he was not a Jew; for as yet the door of the gospel had not been opened to the Gentiles. St Peter, then being at the top of the house, fell into a trance, and saw, as it were, a great sheet of linen let down from heaven, which was full of all kinds of animals and reptiles, both clean and unclean. He had this vision three times, and heard a voice, saying, Arise Peter, kill and eat. But Peter answered, Lord, I have never eaten any thing unclean. The voice replied, Call not that unclean which God has purified. After which the sheet was again taken up into heaven. At the same time, the men came in that had been sent by Cornelius. They acquainted him with what had happened to their master, and desired him to go along with them to Cæsarea. The day following St Peter set out thither, and was accompanied by some of the brethren of Joppa. (See Acts x.)

When Peter was returned to Jerusalem, the faithful of the circumcision said to him, why have you gone unto the uncircumcised, and why did you eat with them? but Peter having related to them all that passed, they were satisfied, and glorified God who had given the gift of repentance leading to life as well to the Gentiles as to the Jews. It is thought, that a little after this Peter went to Antioch, where he founded the Christian church of which he was bishop. (Gal. ii. 11.) It is believed that he continued here seven years, though not constantly; for during the time, he went to Jerusalem, and to the provinces of Asia Minor, to Bithynia, Cappadocia, and Pontus, as is concluded from the epistle that he afterwards addressed to the faithful of these provinces. From thence he went to Rome, in the 42d year of the Christian era; and it is thought that at his leaving Antioch he there named St Ignatius in his place. Tradition thinks, that the chief occasion of his going to Rome was to oppose a common Magus, who by his deceits had converted a great number of persons. However, the presence of St Peter, and the true miracles that he wrought to the truth,

Peter.

Peter.

of Simon, ruined, or much diminished, the reputation of this apostle.

St. Peter, leaving Rome, came to Jerusalem at the passion, in the 4th year of the Christian era, when Herod Agrippa came to persecute the church. That prince put St. James the Greater, brother of John, to the sword (Acts xii. 2, 3.); and perceiving that his death was agreeable to the Jews, he was ever called Peter to be apprehended and put in prison, with a design of executing him privately after the passover. But the very night that Herod thought of putting him to death, as Peter, loaded with chains, was sleeping between two soldiers, the angel of the Lord awakened him, broke out his chains, opened the prison door, and brought him out the length of a street. Then the angel leaving him, he came to the house of Mary the mother of John, where many of the faithful were assembled at prayers; and having knocked at the door, a damsel named Rhoda came to open it; but when she heard Peter's voice, instead of opening the door, she ran in a transport of joy to a quartet de family that Peter was at the door. Those that heard her could not believe it, and said, it was his angel, and not himself; but continuing to knock, and being let in, he informed them of what had happened to him.

He then left Jerusalem; but we are not told what became of him till the time of the council held at Jerusalem in the year 51. It is thought that before this time he made his second journey to Rome, from whence he wrote his first epistle.

St. Peter was obliged to leave Rome in the year 51 by order of the emperor Claudius, who had banished all Jews from thence, because of the tumults they continually raised there, excited by one Chrestus, as Suetonius says, meaning probably by this name Jesus Christ. The apostle then returned into Judea, where was held the council of Jerusalem; in which, after a strict examination of the matter proposed to Peter and the apostles, he spoke to them with much wisdom, saying (Acts xv. 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124, 125, 126, 127, 128, 129, 130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 141, 142, 143, 144, 145, 146, 147, 148, 149, 150, 151, 152, 153, 154, 155, 156, 157, 158, 159, 160, 161, 162, 163, 164, 165, 166, 167, 168, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 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982, 983, 984, 985, 986, 987, 988, 989, 990, 991, 992, 993, 994, 995, 996, 997, 998, 999, 1000).

Some time after, St. Peter coming to Antioch (Gal. ii. 11, &c.), he eat and drank with the Gentiles, without regarding that distinction of meats enjoined by the law. But after that when some of the chief of Jerusalem came to Antioch, he began to withdraw from the converted Gentiles, and would no longer eat with them as before. St. Paul seeing that what St. Peter did might be interpreted as if he had a desire to oblige the Gentiles to Judaize, and to submit themselves to the yoke of the law, and so to revoke and annul

what he himself had determined in the council of Jerusalem, he withstood Peter to his face, and openly expostulated with him, telling him, he was much in the wrong to endeavour to oblige the Gentiles, at least tacitly, by his own manner of acting, to live as the Jews do; and St. Peter received this reprehension with silence and humility.

The particulars of St. Peter's life are little known from the first year of the vulgar era, in which the council of Jerusalem was held, till his last journey to Rome, which was some time before his death. Then being acquainted by revelation that the time of his death was not far off (2 Pet. i. 14.), he had a mind to write to the faithful that had been converted by him, to put them in mind of the truths he had before taught them. He sent them therefore his second epistle.

St. Peter and St. Paul came to Rome about the same time, in the year of Christ 65, where they performed many miracles, and made many converts. Simon Magus by his tricks continued here to deceive the people, pretending himself to be the Messiah, and even attempting to ascend into heaven: for having caused himself to be carried up into the air by his demons, in a fiery chariot, St. Peter and St. Paul took themselves to their prayers; and then the impostor, being forsaken by his demons, fell down upon the ground, which fall some time afterwards occasioned his death. See SIMON MAGUS.

Soon after this, St. Peter was taken up and thrown into prison, where it is said he continued for nine months; at last he was crucified at Rome in the Via Ostia; with his head downwards, as he himself had desired of his executioners. This he did out of a sense of humility, for fear it should be thought, as St. Ambrose says, that he affected the glory of Jesus Christ, and the more to augment the pain of his execution.

It is said, that the body of St. Peter was at first buried in the catacombs, two miles from Rome, from whence it was afterwards transported to the Vatican, where it has lain ever since. His festival is celebrated with that of St. Paul on the 29th of June. St. Peter died in the 60th year of the vulgar era, after having been bishop of Rome for about 24 or 25 years. His age might be about 74 or 75 years. It is generally agreed, that St. Linus was his successor. The following is the portraiture that Nicephorus gives us of St. Peter, which he has probably taken from the ancient pictures that were preserved of this apostle. He was not fat, but pretty tall and upright, having a fair and palish countenance. The hair of his head and beard was thick, frizzled, and not long. His eyes were black, and bloodshot; his eye-brows protuberant and lofty; his nose something long, and rather flat than sharp.

The two epistles of St. Peter are addressed to those Jewish converts who were scattered throughout Pontus, Galatia, &c. not only upon the persecution raised at Jerusalem, but upon former dispersions of the Jews into those places on several other occasions. The first epistle is principally designed to comfort and confirm them under whose fiery trials and manifold temptations they were then subject to, and to direct and instruct them how to behave in the several states and relations both of the civil and the Christian life, that they

they might not be engaged in those rebellions against Cæsar and his officers, then romanced among the Jews; and that they might stop the mouths of those who spoke against them as evil doers. In the second epistle, he prosecutes the same subject, to prevent their apostacy from the faith, on account of any persecutions they were liable to. He likewise guards them against the corrupt principles of the gnostics, and those who scoffed at the promise of Christ's coming, as if it would never be verified.

St Peter's style, says a modern author, expresses the noble vehemence and fervour of his spirit, the full knowledge he had of Christianity, and the strong assurance he had of the truth and certainty of his doctrine; and he writes with the authority of the first man in the college of the apostles. He writes with that quickness and rapidity of style, with that noble neglect of some of the formal consequences and necessities of grammar, still preserving its true reason, and natural analogy (which are always marks of a sublime genius), that you can scarce perceive the pauses of his discourse and distinction of his periods. The great Joseph Scaliger calls St Peter's first epistle majestic; and we hope he was more judicious than to exclude the second, though he did not name it.

A noble majesty, and becoming freedom, is what distinguishes St Peter; a devout and judicious person cannot read him without solemn attention and awful concern. The conflagration of this lower world, and future judgment of angels and men, in the third chapter of the second, is described in such strong and terrible terms, such awful circumstances, that in the description we see the planetary heavens and this our earth wrapped up with devouring flames, hear the groans of an expiring world, and the cruities of nature tumbling into universal ruin.

The authority of the second epistle of St Peter was for some time doubted of, as Origen, Eusebius, St Jerome, and others have observed. What made the ancients call it in question, is the difference of its style from the first. The third chapter, which describes the catastrophe of the visible world, made Grotius think this epistle was wrote after the taking of Jerusalem; because that was not to happen till after the destruction of that city; upon which he conjectures, that Simeon bishop of Jerusalem is the author of this epistle, and that the interpolation which carries St Peter's name is corrupted. But the best critics admit this epistle to be the genuine work of St Peter, who discovers himself, where he says, that he was present at our Lord's transfiguration; and where he tells the Jews, this was the second letter he had written to them. The reader may see this question fully discussed, and the authority of this epistle established beyond all doubt, by the learned Dr Sherlock, in his *Definition* on the authority of the Second Epistle of St Peter.

St Peter has been made the author of several books; such were, his Acts, his Gospel, his Revelation, his work about preaching, and another about judgment. There is extant a large history of St Peter, called the *Recognition*, ascribed to St Clement.

PETER of Biais, a learned man of the 12th century, was born about the year 1122, at the city of Biais in France, from whence he derived his name. His pa-

rents being opulent, gave him a learned education. In his youth, when he studied in the university of Paris, he was excessively fond of poetry; and when he was a little further advanced in life, he became more fond of rhetoric, to the study of which he applied with the greatest ardour. From Paris he removed to Bologna in Italy, to acquire the civil and canon law; in the knowledge of both which he very much excelled. It appears from his writings to have cultivated medicine, and several branches of the mathematics, with no little care and success. The study of theology was the chief delight and business of his life, in which he spent the greatest part of his time, and made the greatest progress. But unfortunately it was that scholastic theology, which consisted in vain attempts to prove and explain the many absurd opinions which then prevailed in the church, by the subtleties of Aristotelian logic. In attempting to explain in this manner the most absurd of all opinions that ever existed amongst mankind, he was the very first person who employed the famous word *transubstantiation*, which was soon after adopted by the church of Rome, and hath ever since made so great a noise. Being appointed preceptor to William II. king of Sicily in 1167, he obtained the custody of the privy seal; and, next to the archbishop of Palermo, the prime minister, had the greatest influence in all affairs. But his power was not of long duration; for the archbishop being banished in 1168, our author soon after left the court of Sicily, and returned into France. He was not long, however, without a royal patron, being invited into England by Henry II. who employed him as his private secretary, made him archdeacon of Bath, and gave him some other benefits. When he had spent a few years at court, he conceived a disgust at that way of life (of which he hath drawn a very unpleasing picture in one of his letters), and retired into the family of Richard archbishop of Canterbury, who had made him his chancellor about the year 1176. In this station he continued to the death of the archbishop in 1183, enjoying the highest degree of favour with that prelate, though he used much freedom in reproving him for his remissness in the government of the church. Our author remained in the same station in the family of archbishop Baldwin, who succeeded Richard, acting both as his secretary and chancellor. He was also sent by that prelate on an embassy to Rome in 1187, to plead his cause before Pope Urban III. in the famous controversy between him and the monks of Canterbury about the church of Hackington. After the departure of his friend and patron Baldwin for the Holy Land in 1190, our author was involved in various troubles in his old age, the nature of which are not distinctly known; and died about the end of the 12th century. He is known from his works, which may be justly reckoned among the most valuable monuments of the age in which he flourished, to have been a man of great integrity and sincere piety, as well as of a lively inventive genius and uncommon erudition. His printed works consist of 134 letters, which he collected together at the desire of Henry II.; of 65 sermons, delivered on various occasions; and of 17 tracts on different subjects.

PETER the Hermit. See CROISADE and PILGRIM.

PETER I. justly styled *Peter the Great*, czar, and afterwards

Peter.

afterwards emperor, of Russia, founder of the Russian empire; for though the country was well known, and of great antiquity, yet it had no extent of power, of political influence, or of general commerce, in Europe, till his time. He was born in 1672; and was proclaimed czar when but ten years of age, in exclusion of John his elder brother, who, being of a sickly constitution, was at the same time very weak in his understanding. The princess Sophia, his half-sister, made an insurrection in favour of John; and to put an end to the civil war, it was at last agreed that the two brothers should jointly share the imperial dignity. Peter had been very ill brought up, not only through the general defects of the Russian education, but likewise through the arts of the princess Sophia, who surrounded him with every thing that might stifle his natural desire of knowledge, deprave his mind, and enervate it with pleasures. Notwithstanding this, his inclination for military exercises discovered itself in his tenderest years. He formed a company of 50 men, commanded by foreign officers, clothed and exercised after the German manner. He entered himself into the lowest post, that of a drummer; and never rose otherwise than as a soldier of fortune. Herein his design was to teach his nobility, that merit, not birth, was the only title to military employments. He reinforced his company with several others, till at last he had got together a considerable body of soldiers. As he then had no war on his hands, he exercised them in all sorts of mock-engagements, and by this means secured to himself a body of well-disciplined troops. The sight of a Dutch vessel, which he had met with on a lake belonging to one of his pleasure-houses, made such an impression on his mind, that he conceived the almost impracticable design of forming a navy. His first care was to get some Hollanders to build some small vessels at Moscow; and he passed two successive summers on board English or Dutch ships, which set out from Archangel, that he might instruct himself in every branch of naval affairs (A). In 1696 czar John died, and Peter was now sole master of the empire. In 1698 he sent an embassy to Holland; and went *incognito* in the retinue, and visited England as well as Holland, in order to inform himself fully in the art of ship-building. At Amsterdam he worked in the yard as a private ship-carpenter, under the name of *Peter*

Michaelof; but he has been often heard to say, that if he had never gone to England, he had still remained ignorant of that art. In 1700 he had got together a body of standing forces, consisting of 30,000 foot; and now the vast project he had formed displayed itself in all its parts. He opened his dominions, which till then had been shut up, having first sent the chief nobility of his empire into foreign countries to improve themselves in knowledge and learning. He invited into Russia all the foreigners he could meet with, who were capable of instructing his subjects in any manner, and offered them great encouragement to settle in his dominions. This raised many discontents; and the despotic authority he exerted on that occasion was scarcely powerful enough to suppress them. In 1700, being strengthened by the alliance of Augustus king of Poland, he made war on Charles XII. king of Sweden. His first ill success did not deter him; for he used to say, I know that my armies must be overcome for a great while; but even this will at last teach them to conquer. He afterwards gained considerable advantages; and founded Petersburg in 1703. In 1709 he gained a complete victory over the Swedes at Pultowa. In 1712 he was inclosed by the Turks on the banks of the Pruth; and seemed inevitably lost, had not the czarina Catherine bribed the grand vizir, and the czar's prudence completed his deliverance. In 1716 he made a tour through Germany and Holland, and visited the royal academy of sciences at Paris. It would be endless to enumerate all the various establishments for which the Russians are obliged to him. He formed an army according to the manner of the politest and most experienced nations: he fitted out fleets in all the four seas which border upon Russia: he caused many strong fortresses to be raised after the best plans; and made convenient harbours: he introduced arts and sciences into his dominions, and freed religion from many superstitious abuses: he made laws, built cities, cut canals, &c.; was generous in rewarding, impartial in punishing; faithful, laborious, and humble; yet was not free from a certain roughness of temper natural to his nation. He had indeed cured himself of excess in drinking; but he has been branded with several other vices, particularly cruelty. He published the unfortunate history of his son prince Alexis (B); towards whom some blame his severity, while others think

(A) The following circumstance, it is said, in some measure determined Peter to attempt those reformatations which he afterwards accomplished. Great events have been sometimes the effect of little causes; and it is at least possible, that without the occurrence we are going to relate, Russia might still have been in a state of barbarism. A young Genevese, called *Le Fort*, about 1695, went to Moscow with the Danish ambassador. The czar Peter, who was then 19 years old, fell in company with this Genevese, who had soon learnt the Russian tongue, and spoke almost all the tongues of Europe. *Le Fort* ingratiated himself with the prince, entered into his service, and soon afterwards into his familiarity. He made him comprehend that there was a different manner of living and reigning from what had unhappily obtained throughout his vast and miserable empire. A prince must be born with an uncommon greatness of soul to listen readily to a stranger, and to be able to divest himself of the prejudices of a throne and of his country. The czar was sensible that neither himself nor his people were yet to be reckoned among men; and that he had an empire to form, but could have no assistance at home. From that time he took a resolution to leave his dominions; and set out, like another Prometheus, to borrow celestial fire for animating his countrymen.

(B) Alexis, like his father, is said to have married a slave, and, like him, quitted Moscow secretly, but had not the same success in his undertakings; and the being but a bad imitator of his father, cost him his life. He became an example of the most terrible severity that ever was given from the tribunal of the throne: but, what

think it no more than was necessary. He perfectly knew the honour due to persons of merit; and not only heaped honours upon them during their life, but gave them marks of esteem even after their death. He died of the strangury in 1725, and left the world with the magnanimity of a hero and the piety of a Christian.

Peter was tall of stature, and of a bold and majestic aspect, though sometimes disfigured by convulsions, which altered his features. This deformity was ascribed to poison, given him, as it is said, by his sister Sophia; but it was indeed no other than wine and brandy, which he often drank to excess, relying too much on the strength of his constitution. He conversed with persons in all stations, from the mechanic to the general of an army; and his conversation was neither like that of a barbarian who makes no distinction between men, nor of a popular prince who seeks to please all the world, but that of a person who aims at instruction. He loved women as much as the king of Sweden, his rival, dreaded them, and

all were equally agreeable to him as well in bed as at board; he valued himself on drinking large draughts, rather than sipping delicious wines. We are told that kings and legislators should never suffer themselves to be transported by passion; but never was any man more passionate than Peter the Great, nor more merciful. In a king this is more than an infirmity for which we make amends by confessing it; but it was generally remarked of Peter, and he himself said to a magistrate of Holland, at his second voyage, "I have reformed my nation, and have not been able to reform myself." It is true, the cruelties with which he is reproached were not novelties at the court of Moscow, any more than at that of Morocco: it was not uncommon to see a czar, with his own royal hand, inflict 100 lashes of a bull's pizzle on the naked shoulders of a prime officer of the crown, or of a lady of the palace, for failing in their duty, by getting drunk; or to try the goodness of his sabre, by striking off the head of a criminal. Peter had himself performed some of those ceremonies of his country;

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is much to the honour of the empress Catherine, she had no hand in the misfortunes of that prince, who was born of another woman, and loved nothing that his father loved. Catherine was not in the least suspected of acting the cruel stepmother. The great crime of the unfortunate Alexis was his being too much a Russian, and his disapproving every thing that was grand and immortal, and projected by his father for the glory of the nation. One day, hearing some Moscovites lamenting the insupportable fatigues they were to undergo in the building of Petersburg, he said, "Take courage, this city will not stand long." When he was called to attend his father in a journey of 600 or 700 leagues, which the czar often made, he feigned sickness. He took violent purges for a distemper which he had not; and such quantities of medicines, with excessive drinking of brandy, impaired his health and his wits. At first he had an inclination to learning, was acquainted with geometry and history, and had learnt the German tongue: but he hated war, and would never learn it; for which he was most reproached by his father. They had married him in 1711 to the princess of Wolfenbuttle, sister of the empress consort to Charles VI. This marriage was unfortunate; the princess was often abandoned for a debauch in brandy, and for Afrosina, a Finland wench, of a large stature, well made, and very agreeable. It is reported that the princess died of chagrin, if it be possible for chagrin to prove mortal; and that afterwards the czarowitz secretly espoused Afrosina in 1713, when the empress Catherine had just brought him a brother, at which he had no reason to be uneasy.

The misunderstandings between the father and the son became every day more serious; till at length the father, about the year 1716, threatened the prince to disinherit him; and the prince told him that he intended to go into a monastery.

The czar, in 1717, renewed his journeys, as well with a view to politics as curiosity. He came at last into France. If the son had entertained an inclination to revolt, if he had actually had a party formed in his favour, now was the time to declare himself; but instead of remaining in Russia, making himself popular, and creating dependents, he took a journey in his turn, having with much difficulty scraped together some thousands of ducats which he had secretly borrowed. He threw himself under the protection of the emperor Charles VI. brother of his deceased wife. They kept him for some time *incognito* at Venice, from whence he passed to Naples, where he resided almost a year, while neither his father nor any person in Russia knew the place of his retreat.

While the son kept himself thus concealed, the father was at Paris, where he was received with all the respect paid him in other places, but with a gallantry nowhere to be found but in France. If he went to visit a manufactory, and one piece of work attracted his sight more than another, he was presented with it the next d. y. He went to dine at the Duke d'Antin's at Petitbourg, where the first thing he saw was his own picture at full length, in the same habit that he wore. When he was at the royal mint of medals, they struck all kinds before him, and presented him with them; at last they struck one which they let drop on purpose at his feet, and left him to take it up. He there saw himself perfectly engraven with these words, *Peter the Great*. The reverse was a Fame, and round her in letters *Vires acquirit cundo*; an allusion no less just than flattering to a prince who really acquired new merit by travelling.

After he had seen this country, where every thing disposes men to gentleness and indulgence, he returned to his own, and resumed his severity. He had engaged his son to return from Naples to Petersburg, from whence that young prince was conducted to Moscow before the czar his father; who began with depriving him of his succession to the throne, by making him sign a solemn act of renunciation at the end of January 1718, in consideration of which act the father promised the son to spare his life.

Peter. Le Fort, however (see note A), had authority enough over him at times to lay his hand even when lifted up to strike, but he had not Le Fort always near him.

The Czar's first marriage is thus related in the memoirs of Peter Henry Bruce, Esq. "It took place in 1690, when he was only 18. He was married to Ortokeffa Lapuchin, a boyar's daughter, by whom he had prince Alexis; some time after he turned her away, and shut her up in a monastery, on suspicion of disloyalty to his bed. It was said, that in one of her jealous fits she charged prince Menzikoff with carrying the czar to drink of his former acquaintance, who had been his customers for cakes; upbraiding him with his first occupation; and that Menzikoff ever after bore an irreconcilable enmity to both her and her son. After the divorce, one Miss Mons, a very beautiful young lady, born at Moscow, of foreign parents, was much in favour with the czar; but when he was abroad, Mr Keyserling, then residing at Moscow as envoy from the king of Prussia, paid his addresses to, and married her. When the czar returned, he was so much offended at Keyserling, that he ordered him to leave Moscow, which occasioned his immediate recall by the king his master, who sent another in his room. It was believed, if his public character had not protected him, he would have severely felt his majesty's displeasure.

"The czar was some time after smitten with the charms of another beautiful young lady, the daughter of a foreign merchant in this city: he first saw her in her father's house, where he dined one day. He was

so much taken with her appearance, that he offered her any terms she pleased, if she would live with him; which this virtuous young woman modestly refused: but dreading the effects of his authority, she put on a resolution, and left Moscow in the night, without communicating her design even to her parents. Having provided a little money for her support, she travelled on foot several miles into the country, till she arrived at a small village where her nurse lived with her husband and their daughter, the young lady's father-sister, to whom she discovered her intention of concealing herself in the wood near that village: and to prevent any discovery, she set out the same night, accompanied by the husband and daughter. The husband being a timber-man by trade, and well acquainted with the wood, conducted her to a little dry spot in the middle of a morass, and there he built a hut for her habitation. She had deposited her money with her nurse to procure little necessities for her support, which were faithfully conveyed to her at night by the nurse or her daughter, by one of whom she was constantly attended in the night time.

"The next day after her flight, the czar called at her father's to see her, and finding the parents in anxious concern for their daughter, and himself disappointed, fancied it a plot of their own concerting. He became angry, and began to threaten them with the effects of his displeasure if she was not produced: nothing was left to the parents but the most solemn protestations, with tears of real sorrow running down their

It was not altogether improbable that such an act would have been some time or other annulled. The czar, therefore, in order to give it more force, forgetting that he was a father, and only remembering that he was the founder of an empire, which his son might overturn, and involve in its ancient barbarity, ordered a public process to be drawn up against that unfortunate prince, for some concealment, with which he was charged, in the confession that they had exacted of him.

An assembly was held of the bishops, inferior ecclesiastics, and professors; who found in the Old Testament, that those who curse their father or their mother should be put to death; that David indeed had pardoned Absalom, who had rebelled against him, but that Absalom was never pardoned by God. Such was their opinion, without drawing any conclusion; but it was in effect signing a warrant for his death. Alexis had not in fact cursed his father, neither had he ever revolted like Absalom; he had never lain publicly with the king's concubines, but he had left the kingdom without his father's permission, and had written letters to his friends, in which he only signified that he hoped they would one day be mindful of him in Russia. But whatever might be his case, of 124 lay judges, who were appointed to sit on him, there was not one that judged his offences less than capital; and those who could not write, made others sign for them. It is reported in Europe, that the czar had got translated from Spanish into Russian the criminal process against Don Carlos, that unfortunate prince whom his father Philip II. had confined in a prison, where the heir of that great monarch ended his days. But there was nothing like a process carried on against Don Carlos, nor was it ever known whether that prince died a natural or a violent death. Peter, the most despotical of princes, wanted not an example. Certain it is that the prince died the day after the sentence, and that the czar had at Moscow one of the best apothecary's shops in Europe. It is probable, however, that the prince Alexis, the heir of the most extensive empire in the world, being condemned unanimously by his father's subjects, which were one day to be his own, might die of the sudden shock and change given to the body at the apprehension of so strange and dismal a sentence. The father went to see his son in his last agonies; and it is said he shed tears. *Infelix utique ferent ea sua nepotes.* These tears, however, did not prevent the wheels from being covered with the broken limbs of his son's friends. He beheaded his own brother-in-law Count Lapuchin, brother to his wife Ortokeffa Lapuchin whom he had divorced, and uncle to prince Alexis. The prince's confessor had also his head cut off. If Muscovy has been civilized, she has, it must be confessed, paid dear for her progress.

The remainder of the czar's life was nothing but a series of grand projects, labours, and exploits, that seemed to efface the memory of his excessive severities, which were perhaps necessary. He made frequent speeches to his court and to his council. In one he told them that he had sacrificed his son to the welfare of his dominions.

Peter. their cheeks, to convince him of their innocence, and ignorance of what was become of her; assuring him of their fears that some fatal disaster must have befallen her, as nothing belonging to her was missing, except what she had on at the time. The czar, satisfied of their sincerity, ordered great search to be made for her; with the offer of a considerable reward to the person who should discover what was become of her, but to no purpose: the parents and relations, apprehending she was no more, went into mourning for her.

“ Above a year after this she was discovered by an accident. A colonel who had come from the army to see his friends, going a hunting into that wood, and following his game through the morass, he came to the hut, and looking into it saw a pretty young woman in a mean dress. After inquiring of her who she was, and how she came to live in so solitary a place, he found out at last that she was the lady whose disappearance had made so great a noise: in the utmost confusion, and with the most fervent intreaties, she prayed him on her knees that he would not betray her; to which he replied, that he thought her danger was now past, as the czar was then otherwise engaged, and that the might with safety discover herself, at least to her parents, with whom he would consult how matters should be managed. The lady agreed to this proposal; and he set out immediately, and overjoyed her parents with the happy discovery: the issue of their deliberations was to consult Madame Catherine (as she was then called) in what manner the affair should be opened to the czar. The colonel went also upon this business, and was advised by Madame to come next morning and she would introduce him to his majesty, when he might make the discovery and claim the promised reward. He went according to appointment; and being introduced, told the accident by which he had discovered the lady, and represented the miserable situation in which he found her, and what she must have suffered by being so long shut up in such a dismal place, from the delicacy of her sex. The czar showed a great deal of concern that he should have been the cause of all her sufferings, declaring that he would endeavour to make her amends. Here Madame Catherine suggested, that she thought the best amends his majesty could make, was to give her a handsome fortune and the colonel for a husband, who had the best right, having caught her in pursuit of his game. The czar, agreeing perfectly with Madame Catherine’s sentiments, ordered one of his favourites to go with the colonel, and bring the young lady home; where she arrived to the inexpressible joy of her family and relations, who had all been in mourning for her. The marriage was under the direction and at the expence of the czar, who himself gave the bride to the bridegroom; saying, that he presented him with one of the most virtuous of women; and accompanied his declaration with very valuable presents, besides settling on her and her heirs three thousand rubles a-year. This lady lived highly esteemed by the czar, and every one who knew her. Besides the concurring reports of other people, I had the story from her own mouth.”

On the whole, that Peter I. was a great man, few

will deny who know what real greatness is. A minute account of the life of this distinguished emperor would make a large volume; we have been able to give but the mere outlines of it: the anecdotes, however, at the end, show in some degree the nature of the man; at all events they show one important truth, that it is a more difficult thing to reform one’s self than to reform a kingdom; to conquer one’s passions, than to conquer the world. The Russians, however, if there is any good in civilization, owe to him every thing: and they seem to be sensible of it; for a very pompous oration was delivered to his memory by Michael Lomonossoff, before the Academy of Sciences at St Petersburg, on the 26th of April 1755. For a minuter account of his improvements, &c. see *Russia, PETERSBURG, and CATHERINE I.*

PETER the Wild Boy. This extraordinary creature occasioned great speculation among the learned; but we do not know that any satisfactory causes have been assigned for the striking difference betwixt him and other human beings.

The following account of him is extracted from the parish-register of North church, in the county of Hertford. “ Peter, commonly known by the name of *Peter the Wild Boy*, lies buried in this churchyard, opposite to the porch. In the year 1725 he was found in the woods near Hamelen, a fortified town in the electorate of Hanover, when his Majesty George I. with his attendants, was hunting in the forest of Hertswold. He was supposed to be then about 12 years of age, and had subsisted in those woods upon the bark of trees, leaves, berries, &c. for some considerable length of time. How long he had continued in that wild state is altogether uncertain; but that he had formerly been under the care of some person, was evident from the remains of a shirt collar about his neck at the time when he was found. As Hamelen was a town where criminals were confined to work upon the fortifications, it was then conjectured at Hanover that Peter might be the issue of one of those criminals, who had either wandered into the woods and could not find his way back again, or being discovered to be an idiot was inhumanly turned out by his parents, and left to perish or shift for himself. In the following year, 1726, he was brought over to England by the order of Queen Caroline then princess of Wales, and put under the care of Dr Arbuthnot with proper masters to attend him. But notwithstanding there appeared to be no natural defect in his organs of speech, after all the pains that had been taken with him he could never be brought distinctly to articulate a single syllable, and proved totally incapable of receiving any instruction. He was afterwards intrusted to the care of Mrs Titchbourn, one of the queen’s bed chamber women, with a handsome pension annexed to the charge. Mrs Titchbourn usually spending a few weeks every summer at the house of Mr James Fenn, a yeoman farmer at Axter’s End in this parish, Peter was left to the care of the said Mr Fenn, who was allowed 35 l. a-year for his support and maintenance. After the death of James Fenn he was transferred to the care of his brother Thomas Fenn, at another farm house in this parish called Broadway, where he lived with the several successive tenants of that farm, and with the same provi-

Peter was allowed by government to the time of his death, Feb. 20. 1785, when he was supposed to be about 72 years of age.

Peter was well made, and of the middle size. His countenance had not the appearance of an idiot, nor was there any thing particular in his form, except that two of the fingers of his left hand were united by a web up to the middle joint. He had a natural ear for music, and was so delighted with it, that if he heard any musical instrument played upon, he would immediately dance and caper about till he was almost quite exhausted with fatigue: and though he could never be taught the distinct utterance of any word, yet he could easily learn to hum a tune. All those idle tales which have been published to the world about his climbing up trees like a squirrel, running upon all fours like a wild beast, &c. are entirely without foundation; for he was so exceedingly timid and gentle in his nature, that he would suffer himself to be governed by a child. There have been also many false stories propagated of his incontinence; but, from the minutest inquiries among those who constantly lived with him, it does not appear that he ever discovered any natural passion for women, though he was subject to the other passions of human nature, such as anger, joy, &c. Upon the approach of bad weather he always appeared sullen and uneasy. At particular seasons of the year he showed a strange fondness for stealing away into the woods, where he would feed eagerly upon leaves, beech-mast, acorns, and the green bark of trees, which proves evidently that he had subsisted in that manner for a considerable length of time before he was first taken. His keeper therefore at such seasons generally kept a strict eye over him, and sometimes even confined him, because if he ever rambled to any distance from his home he could not find his way back again: and once in particular, having gone beyond his knowledge, he wandered as far as Norfolk, where he was taken up, and being carried before a magistrate, was committed to the house of correction in Norwich, and punished as a sturdy and obstinate vagrant, who would not (for indeed he could not) give any account of himself: but Mr Fenn having advertised him in the public papers, he was released from his confinement, and brought back to his usual place of abode.

Notwithstanding the extraordinary and savage state in which Peter was first found greatly excited the attention and curiosity of the public; yet, after all that has been said of him, he was certainly nothing more than a common idiot without the appearance of one. But as men of some eminence in the literary world have in their works published strange opinions and ill-founded conjectures about him, which may seem to stamp a credit upon what they have advanced; that posterity may not through their authority be hereafter misled upon the subject, this short and true account of Peter is recorded in the parish-register by one who

constantly resided above 30 years in his neighbourhood, and had daily opportunities of seeing and observing him."

Perhaps it may not be disagreeable to our readers if we present them with Lord Monboddo's account of this extraordinary creature (A). "It was in the beginning of June 1782 (says his Lordship) that I saw him in a farm-house called Broadway, within about a mile of Berkhamsted, kept there upon a pension which the king pays. He is but low of stature, not exceeding five feet three inches; and although he must now be about 70 years of age, has a fresh healthy look. He wears his beard; his face is not at all ugly or disagreeable; and he has a look that may be called sensible and sagacious for a savage. About 20 years ago he was in use to elope, and to be missing for several days; and once, I was told, he wandered as far as Norfolk; but of late he has been quite tame, and either keeps in the house or saunters about the farm. He has been the 13 last years where he lives at present; and before that he was 12 years with another farmer, whom I saw and conversed with. This farmer told me, that he had been put to school somewhere in Hertfordshire, but had only learned to articulate his own name Peter, and the name of King George, both which I heard him pronounce very distinctly. But the woman of the house where he now is (for the man happened not to be at home) told me, that he understood every thing that was said to him concerning the common affairs of life; and I saw that he readily understood several things that she said to him while I was present. Among other things, she desired him to sing Nancy Dawson; which he did, and another tune which she named. He never was mischievous, but had always that gentleness of nature which I hold to be characteristic of our nature, at least till we became carnivorous, and hunters or warriors. He feeds at present as the farmer and his wife do; but, as I was told by an old woman (one Mrs Collop, living at a village in the neighbourhood called Hempstead, who remembered to have seen him when he first came to Hertfordshire, which she computed to be 55 years before the time I saw her), he then fed very much upon leaves, and particularly upon the leaves of cabbage, which he eat raw. He was then, as she thought, about 15 years of age, walked upright, but could climb trees like a squirrel. At present he not only eats flesh, but has also got the taste of beer, and even of spirits, of which he inclines to drink more than he can get. And the old farmer above-mentioned, with whom he lived 12 years before he came to this last farmer, told me, that he had acquired that taste before he came to him, which is about 25 years ago. He has also become very fond of fire, but has not yet acquired a liking for money; for though he takes it, he does not keep it, but gives it to his landlord or landlady, which I suppose is a lesson that they have taught him.

(A) This eccentric writer, in support of his hypothesis, that man in a state of nature is a mere animal, without clothes, houses, the use of fire, or even speech, adduces the oran-outang, or man in the woods, and this Peter the wild man and others, as examples. He denies the want of the organs of speech as an objection, and insists they only want the artificial use of them.

him. He retains so much of his natural instinct, that he has a fore-feeling of bad weather, growling and howling, and showing great disorder, before it comes.

"These are the particulars concerning him which I observed myself, or could learn by information from the neighbourhood." From all these facts put together his lordship makes the following observations :

"1st, Whatever doubts there may be concerning the humanity of the oran-outang, it was never made a question but that Peter was a man.

"2dly, That he was, as the Dean [Swift] says, of a father and mother like one of us. This, as I have said, was the case of two savages found in the dismal swamps in Virginia, of the one found in the island of Diego Garcia, and of him that was discovered by M. le Roy in the Pyrenees, and in general of all the savages that have been found in Europe within these last 300 years; for I do not believe, that for these 2000 years past there has been a race of such savages in Europe.

"3dly, I think there can be no reason to doubt of what was written from Hanover, and published in the newspapers, that he was found going upon all four, as well as other solitary savages that have been found in Europe. It is true that others have been found erect; which was the case of the two found in the dismal swamp of Virginia, likewise of the man of the Pyrenees, and of him in the island of Diego Garcia: but these I suppose were not exposed till they had learned to walk upright; whereas Peter appears to have been abandoned by his parents before he had learned that lesson, but walked as we know children do at first.

"4thly, I think it is evident that he is not an idiot, not only from his appearance, as I have described it, and from his actions, but from all the accounts that we have of him, both those printed and those attested by persons yet living; for as to the printed accounts, there is not the least information of that kind in any of them, except in one, viz. Wye's letter, n^o 8. wherein is said, that some imputed his not learning to speak to want of understanding; which I should think showed rather want of understanding in those who thought so, when it is considered that at this time he had not been a year out of the woods, and I suppose but a month or two under the care of Dr Arbuthnot, who had taken the charge of his education. The Dean indeed tells us, that he suspected he was a pretender, and no genuine wild man, but not a word of his being an idiot. And as to the persons living, not one with whom I have conversed appeared to have the least suspicion of that kind; though it is natural that men who were not philosophers, and knew nothing of the progress of man from the mere animal to the intellectual creature, nor of the improvement of our understanding by social intercourse and the arts of life, but believed that man when he came to a certain age has from nature all the faculties which we see him exert, and particularly the faculty of speech, should

think him an idiot, and wanting even the capacity of acquiring understanding. I knew an officer of dragoons, a man of very good sense, who was quartered where Peter then lived for some months, and saw him almost every day, and who assured me that he was not an idiot, but showed common understanding, which was all that could be expected from one no better educated than he.

"Lastly, those who have considered what I have said (B) of the difficulty of articulation, will not be surprised that a man who had lived a savage for the first 14 or 15 years of his life, should have made so little progress in that art. I cannot, however, have the least doubt, that if he had been under the care of Mr Braidwood of Edinburgh, he would have learned to speak, though with much more difficulty than a man who had been brought up tame among people who had the use of speech, and who consequently must know the advantage of it. And I can have as little doubt that Mr Braidwood could have taught the oran-outang in Sir Ashton Lever's collection, who learned to articulate a few words, so as to speak plainly enough."

St PETER, Le Port, a market town of England, in the south-east part of Guernsey, in Hampshire, in the British channel, consisting of only one long and narrow street. The mouth of the harbour is well set with rocks, and is on each side defended by a castle, one called the *old castle*, and the other *castle-cornet*. The governor of the island generally resides here, who has the command of the garrison in this and all the other castles. The harbour has a good road, from whence ships may sail with any wind, and from the road pass under the guns of the castle to the pier, close up to the town. The pier is a noble work, formed of vast stones, joined together with great art and regularity; it is not only a security to the ships, but, being contiguous to the town, is handsomely paved at the top with large smooth flag-stone, guarded with parapets, and, being of a great length and breadth, forms a pleasant walk, affording a free prospect of the sea and the neighbouring islands. Cornet-castle, which commands both the town and the harbour, stands on a rock, separated from the land by an arm of the sea, no less than 600 yards wide, and not fordable but at low water in great spring-tides.

St PETER's Island, in the lake of Bienne in Switzerland, remarkable for being one of the retreats of Rousseau; whence it has also got the name of *Rousseau's Island*. It lies towards the south side of the lake, and produces a great variety of shrubs and trees, particularly large oaks, beech, and Spanish chestnut. The southern shore slopes gradually to the lake, and is covered with herbage; the remaining borders are steep and rocky; their summits in a few places thinly covered with shrubs; in others their perpendicular sides are clothed to the water's edge with hanging woods. The views from the different parts of the island are

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(B) Lord Monboddo, far from thinking speech or articulation natural to man, rather wonders how he can by any teaching or imitation attain to the ready performance of such various and complicated operations. Add to this, when the organs are completely formed to one language, how hard it is to make them answer another.

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beautiful and diversified; that to the north being the most extensive and pleasing. It commands the prospect of the lake, which is of an oval form; its cultivated borders, interspersed with villages and castles, with the towns of Nidau and Bienne standing upon the farther extremity. Agreeable walks are carried through the woods, and terminate in a circular pavilion placed in the centre of the island. Before the troubles in France, on Sunday, and particularly the vintage-time, this island was tiled with parties who amused themselves with wandering about the woods or dancing in the circular pavilion. How they employ themselves now it is not so easy to say, as it was overrun and subjected by the forces of that unhappy nation, and of course tainted with their destructive principles. It was retaken by the Spaniards, and properly belongs to the king of Sardinia. There is only one farm-house on the island, in an apartment of which Rousseau was lodged.

PETER Pence, was an annual tribute of one penny, paid at Rome out of every family at the feast of St Peter. And this Ina the Saxon king, when he went in pilgrimage to Rome about the year 740, gave to the pope partly as alms and partly in recompence of a house erected in Rome for English pilgrims. And this continued to be paid generally until the time of King Henry VIII. when it was enacted, that from henceforth no person shall pay any pensions, Peterpence, or other impositions, to the use of the bishop or see of Rome.

PETERBOROUGH, a city of Northamptonshire, about 82 miles from London. It is the least city except perhaps Ely, and unquestionably the poorest bishopric, though one of the oldest towns in England. It had a monastery dedicated to St Peter, and founded as early as the year 655, to which the abbot of Croyland and his monks flying for protection in the year 870, they were overtaken and murdered in a court of this monastery called the *monks churchyard*, because they were all buried here; and to this day is to be seen the tombstone with their effigies, which had been erected over their common grave. Soon after this the Danes destroyed both the monastery and friars, so that it lay desolate for above 100 years. The monks were, however, restored, and lived very sumptuously, with a mitred abbot at their head, till the reformation, when Henry VIII. converted it into a bishop's see. The cathedral, which is said to be more than 1000 years old, though apparently more modern, is a most noble Gothic fabric, and was much more so before it was defaced in the civil wars. The west front, which is 156 feet broad, is very stately; and besides columns curiously adorned, is supported by three of the tallest arches in Britain. The windows of the cloisters are finely stained with scripture-history and the succession of its abbots. There are in the church monuments of Queen Catharine, wife of Henry VIII. and of Mary queen of Scots; and the figure of one Mr Scarlet the sexton, who buried them, and lived to 95, after he had buried all the housekeepers of the town twice over. There is but one parish-church besides the cathedral. The city is governed by a mayor, recorder, and aldermen, by a charter of Henry VIII. All its officers are elected by the dean and chapter, consisting of six prebendaries, who are all lords of the manor. Besides the

dean and chapter, who are an ecclesiastical corporation distinct from the bishop, there are eight petty canons, four students in divinity, one epistler, one gospeller, a subdean, subtreasurer, and chanter, eight choristers, eight singing men, two chancellors, besides a steward, organist, &c. a grammar school, and two charity-schools. The river Nen, over which there is here a wooden bridge, is navigable by barges to Northampton, 50 miles further, which bring coal, corn, &c. and by which they export in some years 6000 quarters of malt, besides other goods, especially the woollen manufactures either of cloth or stockings, in which the poor are employed. The air of Peterborough is said not to be very wholesome, by reason of the neighbouring fens; but the water of the river is fresh and good, the highest spring tide never coming up within five miles of the town; and there is plenty of excellent water in their wells. The streets are very poor, and the houses but mean; there is, however, a handsome market-house, over which are kept the assizes and sessions. Its jurisdiction extends over 32 towns and hamlets, wherein the civil magistrates appointed by the royal commission are vested with the same power as judges of assize, and hold their quarterly sessions in this city.

PETERHEAD, a town in Scotland, in the county of Aberdeen, lies about 30 miles north-east of that city. It stands on the most easterly point in Scotland, and from thence due west that kingdom is broadest.

Peterhead is the nearest land to the northern continent of Europe, and lies within 300 miles of the cape, which is called the *Naze of Norway*. Through this channel the grand body of the herrings pass in their annual migrations from Shetland and the north seas to the more southern latitudes, attended with the all-devouring cod and ling; on which account Peterhead, or, as it is sometimes called, *Buchanness*, hath always been the second station of the Dutch buffes after leaving the Shetland islands. Tradition says, that some hundred years ago the Dutch offered Lord Mareschal, then the proprietor of the coast, to cover a small island called *Inch-Keith* with silver for the property of it to carry on their fisheries, which for obvious reasons could not be accepted. Be that as it may, the Dutch still frequent the coast in July and August, and sometimes 100 sail are seen within sight of land, busily employed in the herring and white fisheries. The natives, to whom this treasure properly belongs, have lately made some attempts towards the white fishery, of which they cure and vend chiefly at the London market 4000 barrels of delicate small cod and ling annually. They also fit out some vessels for the Hebride fishery off Barrahead for the Barcelona market; and they claim the merit of having taught the islanders how to take and cure the large fish which abound on their coasts. They have often gained the highest premiums allowed by government for curing white fishes.

Few harbours in Great Britain are of more importance to navigation than this of Peterhead, as, in case of violent storms from the easterly points, large vessels embayed betwixt this and the mouth of the Forth have not a port that they can safely take at every time of the tide, that of Aberdeen excepted. If therefore they cannot make their way to sea in the teeth of a strong easterly wind, or double this headland that they may gain the Murray frith, they must inevitably come on

on shore. This harbour lies on a spacious bay, where vessels of any burden may ride in all other winds, and is therefore the general rendezvous of the shipping which frequent the northern seas, where they cast anchor on clean ground, and ride safely till the storms have abated. But though nature hath done so much for the benefit of navigation, something is left for the exercise of human art. The harbour can at present contain in perfect safety 40 or 50 sail of vessels drawing 12 feet water, and is capable of being extended to as to admit a greater number of ships drawing 20 feet; by which means not only casual merchantmen but small ships of war with their convoys would find this a most desirable refuge when pursued by superior force. The harbour is defended by a good battery. A considerable trade is carried on from this place directly to the Baltic for deal, iron, hemp, tar, and other articles. There is also a manufacture of sewing thread, which employs many young girls. A mineral well in the summer months gives great variety to the place; its salutary virtues have long, and we believe very justly, been celebrated. The waters of this spring are powerfully diuretic, and are thought to be efficacious in removing complaints in the bowels. There are here many elegant houses for the accommodation of strangers. There is also a ball-room, under which there are two salt-water baths. These baths are much frequented in nervous disorders: their effect in strengthening the constitution is often surprising. Owing to the open peninsulated situation, the air of this place is esteemed peculiarly pure and healthful; even the fogs rising from the sea are thought to be medicinal: the town is therefore much enlivened by the concourse of company who frequent it on these accounts. Upon the whole, the town is neat and well built, the houses are handsome, and the streets tolerably spacious and very clean; and it has every appearance of a thriving, plentiful, and happy place.

PETERHOFF, in Russia, is situated about 20 miles from Petersburg, and is distinguished for its palace and gardens. The palace was begun by Peter I. and finished by Elizabeth. As it is placed upon an eminence, it commands a most superb view of Cronstadt, Petersburg, the intervening gulf, and the opposite coast of Carelia. The palace is most magnificently furnished, and the suite of apartments are truly princely. The presence-chamber is richly ornamented with portraits of the sovereigns of the house of Romanoff, who have reigned in Russia since 1613.

"The gardens of Peterhoff (says an intelligent traveller) have been celebrated for their taste and elegance; and from the number of jet d'eau, fountains, basins, cascades, parterres, &c. they have been compared to those of Versailles: and indeed in one respect they are far superior; for the water-works of the latter only play upon particular occasions, while those of Peterhoff are perennial. These gardens, which at the time of their formation were greatly admired in this country, though not congenial to the taste of the empress, are suffered to remain in their present state; as during summer her majesty principally resides at Zarhof Selo, where the grounds are disposed in a more modern and pleasing manner." A vast number of silver dolphins and gilded statues are scattered about them, but the most remarkable figures are those of two gla-

diators placed in a basin of water. These are represented, not with the sword and buckler, the ancient implements of war, but with a trace of pistols. These they point to each other in a threatening posture, while the water gushes impetuously from the barrels. In that part of the garden which lies between the palace and the gulf, close to the water, is a building which was the favourite retreat of Peter I. It is preserved, together with its furniture, entirely in its original state with a kind of religious veneration. Its plainness shows the frugal simplicity in which that monarch was accustomed to live. In the same celebrated gardens there is a remarkable building called the *mountain for sledges*, and often by travellers the *flying mountain*. "It stands (says Mr Coxe) in the middle of an oblong area, inclosed by an open colonnade, with a flat roof, which is railed for the convenience of holding spectators. The circumference of this colonnade is at least half a mile. In the middle of the area stands the flying mountain, stretching nearly from one end to the other. It is a wooden building, supported upon pillars, representing an uneven surface of ground, or a mountain composed of three principal ascents, gradually diminishing in height, with an intermediate space to resemble valleys: from top to bottom is a floored way, in which three parallel grooves are formed. It is thus used: a small carriage containing one person being placed in the centre groove upon the highest point, goes with great rapidity down one hill; the velocity which it acquires in its descent carries it up a second; and it continues to move in a similar manner until it arrives at the bottom of the area, where it rolls for a considerable way on the level surface, and stops before it attains the boundary: it is then placed in one of the side grooves, and drawn up by means of a cord fixed to a windlass. To a person unacquainted with the mechanism, this entertainment would appear tremendous; but as the grooves always keep the carriage in its right direction, there is not the least danger of being overturned. At the top of the mountain is a handsome apartment for the accommodation of the court and principal nobility; there is also room for many thousand spectators within the colonnade and upon its roof. Near the flying mountain is a spacious amphitheatre, in which tournaments are usually exhibited."

PETERS (Father), a Jesuit, was confessor and counsellor to James II. king of England. This prince dismissed him in 1688, because he was considered as the author of those troubles, in which the kingdom was then involved. "He was (says Bishop Burnet) the most violent of the king's advisers, and the person most listened to. Though he had the honour of being nobly descended, he was a man of no extensive erudition, and was eminent only for his bigotry and forwardness." Though Burnet is not always to be believed, yet certain it is, from the testimony of other historians, that Father Peters was by no means a person properly qualified to direct King James in the critical situation in which he then stood.

PETERSBURG (St), a city of the province of Ingria in Russia, and capital of the whole empire. It is situated in N. Lat. 59. 26. 23. and E. Long. 30. 25. from the first meridian of Greenwich. It was founded in the year 1703 by Czar Peter the Great, whose

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Petersburg.

Peterburg.

ambition it was to have a fleet on the Baltic; for which reason he determined to found a city which might become the centre of trade throughout all his dominions. The spot he pitched upon was a low, fenny, uncultivated island, formed by the branches of the river Neva, before they fall into the gulf of Finland. In the summer this island was covered with mud; and in winter became a frozen pool, rendered almost inaccessible by dreary forests and deep morasses, the haunts of bears, wolves, and other savage animals. Having taken the fort of Nattenbourg, and the town of Neifchantz, in the year 1703, this mighty conqueror assembled in Ingria above 300,000 men, Russians, Tartars, Cossacks, Livonians, and others, even from the most distant parts of his empire, and laid the foundation of the citadel and fortifications, which were finished in four months, almost in despite of nature. He was obliged to open ways through forests, drain bogs, raise dykes, and lay causeways, before he could pretend to found the new city. The workmen were all provided with necessary tools and implements, such as spades, pick-axes, shovels, planks, and wheel-barrows: they were even obliged to fetch the earth from a great distance in the skirts of their garments, or in little bags made of old mats and rags sewed together. They had neither huts nor houses to shelter them from the severity of the weather: the country, which had been desolated by war, could not accommodate such a multitude with provisions; and the supplies by the lake Ladoga were often retarded by contrary winds. In consequence of these hardships, above 100,000 men are said to have perished: nevertheless the work proceeded with incredible vigour and expedition; while Peter, for the security of his workmen, formed a great camp, in such a manner, that his infantry continued in Finland, and his cavalry were quartered in Ingria. Some Swedish cruizers being desferied in the neighbourhood, the Czar posted a body of troops in the isle of Rutzari, by whom the Swedes were repulsed, and the work met with no farther interruption. The buildings of the city kept pace with the fortress, which is the centre of the town, surrounded on all sides by the Neva; and in little more than a year, above 30,000 houses were erected. At present there may be about double that number in Petersburg, though many of them are paultry and inconsiderable. In order to people this city, Peter invited hither merchants, artificers, mechanics, and seamen, from all the different countries of Europe: he demolished the town of Nieuschants, and brought hither not only the materials of the houses, but the inhabitants themselves. A thousand families were drawn from Moscow; he obliged his nobility to quit their palaces and their villas in and about Moscow, and take up their residence at Petersburg, in a much more cold and comfortable climate. Finally, resolving to remove hither the trade of Archangel, he issued an ordonnance, importing, that all such merchandise as had been conveyed to Archangel, in order to be sold to foreigners, should now be sent to Petersburg, where they should pay no more than the usual duties. These endeavours and regulations have rendered this one of the greatest and most flourishing cities in Europe. The Russian boyars and nobility have built magnificent palaces, and are now reconciled to their situation. At first many

houses were built of timber; but these being subject to sudden conflagrations in spite of all the precautions that could be taken, the Czar, in the year 1714, issued an order, that all new houses should be walled with brick and covered with tiles. The fort is an irregular hexagon, with opposite bastions. This, together with all the rest of the fortifications, was in the beginning formed of earth only; but in the sequel they were faced with strong walls, and provided with casemates, which are bomb proof. In the curtain of the fort, on the right hand side, is a noble dispensary, well supplied with excellent medicines, and enriched with a great number of porcelain vases from China and Japan. From one of the gates of the fort a draw-bridge is thrown over an arm of the river, in which the Czar's galleys and other small vessels are sheltered in the winter. The most remarkable building within the fort is the cathedral, built by the direction of an Italian architect. Petersburg is partly built on little islands, some of which are connected by draw-bridges; and partly on the continent. In the highest part, on the bank of the Neva, the Czar fixed his habitation, or ordinary residence, built of freestone, and situated so as to command a prospect of the greater part of the city. Here likewise is a royal foundry; together with the superb houses of many noblemen. The marshy ground on which the city is built, being found extremely slippery, dirty, and incommodious, the Czar ordered every inhabitant to pave a certain space before his own door. In the year 1716, Peter, taking a fancy to the island Wassli-Osterno, which he had given as a present to prince Menzikoff, resumed the grant, and ordered the city to be extended into this quarter. He even obliged the boyars, or nobles, to build stone-houses on this spot, though they were already in possession of others on the side of Ingria: accordingly this is now the most magnificent part of the city. On the other side of a branch of the Neva stands the Czar's country or summer palace, provided with a fine garden and orangery. On the bank of the same river is the slaboda, or suburbs, in which the Germans generally choose their habitation. Petersburg is very much subject to dangerous inundations. In the year 1715, all the bastions and draw-bridges were either overwhelmed or carried away. The breadth, depth, and rapidity of the Neva, have rendered it extremely difficult, if not impracticable, to join the islands and the continent by bridges. Besides, Peter was averse to this expedient for another reason: resolved to accustom his subjects to navigation, he not only rejected the project of a bridge, but also ordered that no boat should pass between the islands and continent, except by the help of sails only. In consequence of this strange regulation, many lives were lost: but at length he gained his point; and by habituating his sluggish Muscovites to the dangers of the sea, in a little time produced a breed of hardy sailors. The adjacent country is so barren, that the town must be supplied with provisions from a great distance; consequently they are extremely dear. Here are woods in plenty, consisting of pine, fir, alder, birch, poplar, and elm; but the oak and the beech are generally brought from Casan. In winter the weather is extremely cold, and hot in the summer. In June the length of the night does not exceed three hours, during which the natives

lives enjoy a continued twilight: but in December the sun is not visible more than three hours above the horizon.

The Czar Peter, who was indefatigable in his endeavours to improve and civilize his subjects, neglected nothing which he thought could contribute to these purposes. He condescended even to institute and regulate assemblies at Petersburg: these were opened at five in the afternoon, and the house was shut at ten: between these hours the fashionable people of both sexes met without ceremony, danced, conversed, or played either at cards or at chess, this last being a favourite diversion among the Russians. There was likewise an apartment appointed for drinking brandy and smoking tobacco. Plays and operas were likewise introduced for the same purposes; but as Peter had little relish, and less taste, for those entertainments, they were performed in a very aukward manner in his lifetime: however, since his death these performances have been brought to a greater degree of art and decorum.

This great northern legislator established, in the neighbourhood of Petersburg, manufactures of linen, paper, saltpetre, sulphur, gunpowder, and bricks, together with water-mills for sawing timber. He instituted a marine academy, and obliged every considerable family in Russia to send at least one son or kinsman, between the ages of ten and eighteen, to this seminary, where he was instructed in navigation, learned the languages, was taught to perform his exercises, and to live under the severest discipline. To crown his other plans of reformation, he granted letters patent for founding an academy, upon a very liberal endowment; and though he did not live to execute this scheme, his empress, who survived him, brought it to perfection. It was modelled on the plans of the royal society in London, and the academy of France. Mr Bullfinger opened it in the year 1726, with an eloquent speech on the design and utility of an academy of sciences; and the professors, who have always distinguished themselves by their merit and erudition, published an annual collection of their transactions; a task the more easy, as they have the benefit of printing-presses, well managed, at Petersburg.

Peter the Great has been much censured for transferring the seat of the empire from Moscow to St Petersburg; the former of which lay nearer to the centre of his dominions. But these objections will have but little weight with those who consider the consequences of the removal. The new city is nearer than Moscow was to the more civilized parts of Europe; and from an intercourse with them the manners of the Russians have been improved, and the nobility in particular have lost much of their feudal importance. Above all, the grand object of Peter, that of having a formidable navy in the Baltic, has certainly been obtained, and the Empress of Russia is now the arbitress of the north, and in some degree the mediatrix of all Europe. In short, the erection of St Petersburg was perhaps one of the best acts of Peter's reign, and has in its consequences been the most beneficial. Indeed it is at least probable, that if through any revolution the seat of government should be again transferred to Moscow, we should nowhere see the traces of those memorable

improvements, which the passing century has given birth to, but in the annals of history; and Russia would again, in all probability, relapse into her original barbarism.

The erection of such a city as Petersburg in so short a time is truly wonderful. Mr Coxe says his mind was filled with astonishment, when he reflected that so late as the beginning of this century the ground on which it stands was one vast morass, occupied by a very few fishermen's huts. The present divisions of the town, some of which we have already mentioned, are called, 1. The Admiralty quarter; 2. The Vassili Ostrof or Island; 3. The Fortrefs; 4. The Island of St Petersburg; and, 5. The various suburbs of Livonia, of Moscow, of Alexander Nevski, and Wiburgh.

The present Empress has done so much for this city, that she may not improperly be called its second founder. It is, nevertheless, still an infant place, and, as Mr Wraxhall observes, "only an immense outline, which will require future empresses, and almost future ages, to complete."

"The streets in general, says a late traveller, are broad and spacious; and three of the principal ones, which meet in a point at the Admiralty, and reach to the extremities of the suburbs, are at least two miles in length. Most of them are paved; but a few are still suffered to remain floored with planks. In several parts of the metropolis, particularly in the Vassili Ostrof, wooden houses and habitations, scarcely superior to common cottages, are blended with the public buildings; but this motley mixture is far less common than at Moscow, where alone can be formed any idea of an ancient Russian city. The brick houses are ornamented with a white stucco, which has led several travellers to say that they are built with stone; whereas, unless I am greatly mistaken, there are only two stone structures in all Petersburg. The one is a palace, building by the empress upon the banks of the Neva, called the *marble palace*; it is of hewn granite, with marble columns and ornaments; the other is the church of St Isaac, constructed with the same materials, but not yet finished.

"The mansions of the nobility are many of them vast piles of building, but are not in general upon so large and magnificent a scale as several I observed at Moscow: they are furnished with great cost, and in the same elegant style as at Paris or London. They are situated chiefly on the south side of the Neva, either in the Admiralty quarter, or in the suburbs of Livonia and Moscow, which are the finest parts of the city." See NEVA.

"Petersburg, although it is more compact than the other Russian cities, and has the houses in many streets contiguous to each other, yet still bears a resemblance to the towns of this country, and is built in a very straggling manner. By an order lately issued from government, the city has been inclosed within a rampart, the circumference whereof is 21 versts, or 14 English miles."

The same accurate observer calculates the number of inhabitants at Petersburg, and makes the medium number 130,000.

We have already said that Petersburg is very liable to be inundated. An inundation of a very alarming nature took place when Mr Coxe was there in Sep-

Journal de St. Pierrebourg, of which the following account was given in *Journal St. Peterbourg*, September 1777: "In the evening of the 9th, a violent storm of wind blowing at first S. W. and afterwards W. raised the Neva and its various branches to so great an height, that at five in the morning the waters poured over their banks, and suddenly overflowed the town, but more particularly the Vassili Oprof and the island of St. Peterbourg. The torrent rose in several streets to the depth of four feet and an half, and overturned, by its rapidity, various buildings and bridges. About seven, the wind shifting to N. W. the flood fell as suddenly; and at mid-day most of the streets, which in the morning could only be passed in boats, became dry. For a short time the river rose 10 feet 7 inches above its ordinary level."

Mr Kraft, professor of experimental philosophy to the Imperial Academy of Sciences, has written a judicious treatise upon the inundation of the Neva, from which the following observations were extracted by Mr Coxe. "These floods are less alarming than formerly, as the swelling of the river to about six feet above its usual level, which used to overflow the whole town, have no longer any effect, excepting upon the lower parts of Petersburg; a circumstance owing to the gradual raising of the ground by buildings and other causes."

"Upon tracing the principal inundations, the professor informs us, that the most ancient, of which there is any tradition, happened in 1691, and is mentioned by Weber, from the account of some fishermen inhabiting near Nischlants, a Swedish redoubt upon the Neva, about three miles from the present fortress of Petersburg. At that period the waters usually rose every five years; and the inhabitants of that district no sooner perceived the particular storms which they had been taught from fatal experience to consider as forerunners of a flood, than they took their hovels to pieces, and, joining the timbers together in the form of rafts, fastened them to the summits of the highest trees, and repaired to the mountain of Duderof, which is distant six miles from their place of abode, where they waited until the waters subsided."

"The highest inundations, excepting the last of 1777, were those of the 1st of November 1726, when the waters rose 8 feet 2 inches; and on the 2d of October 1752, when they rose 8 feet 5 inches."

"From a long course of observations the professor draws the following conclusion. The highest floods, namely, those which rise about six feet, have generally happened in one of the four last months of the year: no sensible effect is ever produced by rain or snow; a swell is sometimes occasioned by the accumulation of masses of ice at the mouth of the Neva; but the principal causes of the overflowing of that river are derived from violent storms and winds blowing south west or north west, which usually prevail at the autumnal equinox; and the height of the waters is always in proportion to the violence and duration of those winds. In a word, the circumstances most liable to promote the overflows of the Neva, are when, at the autumnal equinox, three or four days before or after the full or new moon, that luminary being near her perigæum, a violent north-west wind drives the waters of the northern ocean, during the influx of the tide,

into the Baltic, and is accompanied, or instantaneous-Peter-ously succeeded, by a south west wind in that sea and the gulf of Finland. All these circumstances concurred at the inundation of 1777: it happened two days before the autumnal equinox, four before the full moon, two after her passing through the perigæum, and by a storm at south-west, which was preceded by strong west winds in the northern ocean, and strong north winds at the mouth of the Baltic."

See *Notices et Remarques sur les débordemens de la Neva à St. Peterbourg, accompagnées d'une carte représentant la crue et la diminution des eaux*. See in *Nov. Ac. Pet.* for 1777, P. II. p. 47. to which excellent treatise we would refer the curious reader for further information.

All our readers have unquestionably heard of the equestrian statue of Peter I. in bronze. We shall give an account of that extraordinary monument in Mr Coxe's own words. "It is (says he) of a colossal size, and is the work of Monsieur Falconet, the celebrated French statuary, cast at the expence of Catherine II. in honour of her great predecessor, whom the reveres and imitates. It represents that monarch in the attitude of mounting a precipice, the summit of which he has nearly attained. He appears crowned with laurel, in a loose Asiatic vest, and sitting on a housing of bear-skin: his right hand is stretched out as in the act of giving benediction to his people; and his left holds the reins. The design is masterly, and the attitude is bold and spirited. If there be any defect in the figure, it consists in the flat position of the right hand; and, for this reason, the view of the left side is the most striking, where the whole appearance is graceful and animated. The horse is rearing upon its hind legs; and its tail, which is full and flowing, slightly touches a bronze serpent, artfully contrived to assist in supporting the vast weight of the statue in due equilibrium. The artist has, in this noble essay of his genius, represented Peter as the legislator of his country, without any allusion to conquest and bloodshed; wisely preferring his civil qualities to his military exploits. The contrast between the composed tranquillity of Peter (though perhaps not absolutely characteristic) and the fire of the horse, eager to press forwards, is very striking. The simplicity of the inscription corresponds to the sublimity of the design, and is far preferable to a pompous detail of exalted virtues, which the voice of flattery applies to every sovereign without distinction. It is elegantly finished in brass characters, on one side in Latin, and on the opposite in Russian. *Petro primo Catharina secunda* 1782, i. e. Catherine II. to Peter I."

"The statue, when I was at Petersburg, was not erected, but stood under a large wooden shed near the Neva, within a few yards of its enormous pedestal. When Falconet had conceived the design of his statue, the base of which was to be formed by an huge rock, he carefully examined the environs of Petersburg, if, among the detached pieces of granite which are scattered about these parts, one could be found of magnitude correspondent to the dimensions of the equestrian figure. After considerable research, he discovered a stupendous mass half buried in the midst of a morass. The expence and difficulty of transporting it were no obstacles to Catherine II. By her order the

urg. the morafs was immediately drained, a road was cut through a forest, and carried over the-marfhy ground; and the ftone, which after it had been fomewhat reduced weighed at leaft 1500 tons, was removed to Petersburg. This more than Roman work was, in lefs than fix months from the time of its firft difcovery, accomplifhed by a windlafs, and by means of large friction-balls alternately placed and removed in grooves fixed on each fide of the road. In this manner it was drawn, with forty men feated upon its top, about four miles to the banks of the Neva; there it was embarked in a vefTel conftituted on purpofe to receive it, and thus conveyed about the fame diftance by water to the fpot where it now ftands. When landed at Peterfburg, it was 42 feet long at the bafe, 36 at the top, 21 thick, and 17 high; a bulk greatly furpaffing in weight the moft boafled monuments of Roman grandeur, which, according to the fond admirers of antiquity, would have baffled the fkill of modern mechanics, and were alone fufficient to render conspicuous the reign of the moft degenerate emperors.

"The pedeftal, however, though ftill of prodigious magnitude, is far from retaining its original dimenfions, as, in order to form a proper ftation for the ftatue, and to represent an afcent, the fummit whereof the horfe is endeavouring to attain, its bulk has been neceffarily diminifhed. But I could not obferve, without regret, that the artift has been defirous to improve upon nature; and, in order to produce a refemblance of an abrupt broken precipice, has been too lavish of the chiffel. Near it was a model in plafter, to the fhape of which the workmen were fhaftioning the pedeftal. It appeared to me, that in this model the art was too conspicuous; and that the effect would have been far more fublime, if the ftone had been left as much as poffible in its rude ftate, a vaft unwieldy ftupendous maf. And indeed, unlefs I am greatly miftaken, the pedeftal, when finifhed according to this plan, will have fcarcely breadth fufficient to afford a proper bafe for a ftatue of fuch Coloffal fize.

"The ftatue was erected on the pedeftal on the 27th of Auguft 1782. The ceremony was performed with great folemnity, and was accompanied with a folemn inauguration. At the fame time the emperfs iffued a proclamation, in which, among other inftances of her clemency, fhe pardons all criminals under fentence of death; all deferters, who fhould return to their refpective corps within a limited time; and releafes all criminals condemned to hard labour, provided they had not been guilty of murder."

Mr Coxe informs us, that the weather is extremely changeable in this capital, and the cold is at times extreme; againft which the inhabitants take care to provide (fee PEASANT), though fome of them nevertheless unfortunately fall victims to it. "As I traversed the city, fays Mr Coxe, on the morning of 12th January, I obferved feveral perfons whofe faces had been bitten by the froft: their cheeks had large fcars, and appeared as if they had been finged with an hot iron. As I was walking with an Englifh gentleman, who, inftead of a fur cap, had put on a common hat, his ears were fuddenly frozen: he felt no pain, and would not have perceived it for fome time, if a Ruffian, in paffing by, had not informed him of it, and affifted him in rubbing the part affected with fnow, by which means it

was inflantly recovered. This, or friction with flannel, is the ufual remedy; but fhould the perfon in that ftate approach the fire, or dip the part in warm water, it immediately mortifies and drops off.—The common people continued at their work as ufual, and the drivers plied in the ftreets with their fiedges feemingly unaffected by the froft; their beards were incrufted with clotted ice, and the horfes were covered with ificles.

"It fometimes happens that coachmen or fervants, while they are waiting for their mafters, are frozen to death. In order to prevent as much as poffible thefe dreadful accidents, great fires of whole trees, piled one upon another, are kindled in the court-yard of the palace and the moft frequented parts of the town. As the flames blazed above the tops of the houfes, and caft a glare to a confiderable diftance, I was frequently much amufed by contemplating the picturefque groups of Ruffians, with their Afatic drefs and long beards, afsembled round the fire. The centinels upon duty, having no beards, which are of great ufe to protect the glands of the throat, generally tie handkerchiefs under their chins, and cover their ears with mail cafes of flannel."

PETERSBURG, in America, is a fea-port town in Virginia, 25 miles fouthward of Richmond, feated on the fouth fide of the Appamatox river, about 12 miles above its junction with James River, and contained nearly 300 houfes in 1787, in two divifions; one is upon a clay, cold foil, and is very dirty; the other upon a plain of fand or loam. There is no regularity, and very little elegance in Petersburg. It is merely a place of bufinefs. The Free Mafons have a hall tolerably elegant; and the feat of the Bowling family is pleafant and well built. It is very unhealthy. About 2200 hogfheads of tobacco are infpected here annually. Like Richmond, Williamsburg, Alexandria, and Norfolk, it is a corporation; and what is fingular, Petersburg city comprehends part of three counties. The celebrated Indian queen, Pocahonta, from whom defcended the Randolph and Bowling families, formerly refided at this place.

PETERSFIELD, is a handsome town of Hampfhire in England, and fends two members to parliament. It is feated in W. Long. 1. 5. N. Lat. 51. 5.

PETERWARADIN, a fortified town in Sclavonia, and one of the ftrongeft frontier places the houfe of Aultria has againft the Turks, feated on the Danube between the Drave and the Save. E. Long. 20. 0. N. Lat. 45. 20.

PETIOLE, in botany, the fender ftalks that fupport the leaves of a plant.

PETIT, or PETITE, a French word fignifying little or fmall.

PETITE Guerre, denotes the operations of detached parties and the war of pofts. See WAR, Part III.

PETIT Sergeanty. See SERGEANTY.

PETIT Treafon. See TREASON.

PETIT (John), a doctör of the Sorbonne, very early gained to himfelf a character by his knowledge, and thofe eloquent orations which he pronounced before the univerfity of Paris. He was employed in the famous embaffy which was fent from France to Rome, for the purpofe of healing the fchifm in 1497; but he foon loft all the honour which he had acquired. John

Petit.

Sans Peur, duke of Burgundy, having treacherously contrived to assassinate Louis of France, duke of Orleans, only brother to Charles VI. John Petit, entirely devoted to the views of the murderer, maintained in a public disputation, at Paris, the 8th of March 1408, that the murder was lawful. He had the effrontery to assert, that "it is allowable to employ fraud, treason, and every other method, however base, in order to get rid of a tyrant; and that no faith ought to be kept with him." He dared to add further, that "the man who should commit such an action, not only deserved to be exempted from punishment, but to receive a reward." This sanguinary doctrine was loudly exclaimed against; but the duke of Burgundy's powerful influence sheltered Petit for some time. Some eminent writers, however, of that period, with Gerson at their head, denounced the doctrine to John de Montaigu, bishop of Paris, who condemned it as heretical the 23d November 1414. It was likewise condemned by the council of Constance the year following at the instigation of Gerson; but no notice was taken either of Petit's name or his writings. In fine, the king, on the 16th of September 1416, ordered the parliament of Paris to pronounce a severe decree against this dangerous performance; and it was also censured by the university. But the duke of Burgundy, in 1418, had interest enough to compel the grand vicars of the bishop of Paris, who then lay sick at St Omer's, to retract the sentence which that prelate had past in 1414. Petit died three years before, *i. e.* in 1411, at Hesdin; and his apology in favour of the duke of Burgundy, with all the particulars of that infamous transaction, may be seen in the fifth volume of the last edition of Gerson's works. Father Pinchinat, of the order of St Francis, and author of the Dictionary of Heresies, in 14to, has endeavoured to vindicate his order from a charge brought by some writers who have called Petit a *Cordelier* or *Franciscan friar*. "He proves very clearly (says Abbé Prevot) that he was a secular priest; and adds, that upon the same evidence, Father Mercier, a Cordelier, had a warm dispute in 1717 with M. Dupin, who had given this title to Petit in his Collection of Censures. He represented to him (says he), before a meeting of the Faculty, the fallacy of such a claim, and the injury which he offered to the order of St Francis. Dupin, convinced of his error, candidly owned that he was led into it by following some infidel writers, and promised to retract it in the new edition of the Censures, which was published in 1720. M. Fleury, who had committed the same mistake, promised also to make amends for it by a solemn recantation; but dying before he had an opportunity of doing that piece of justice to the Cordeliers, the continuator of his Ecclesiastical History, who had not such opportunities of information, fell into the same fault." (*Pour & contre*, tom. x. p. 23.) If we take the opinion of L'Advocat's Dictionary, it would appear no fault was committed; for it gives a list of the pensioners of the dukes of Burgundy, in order to prove that John Petit was a Cordelier. Indeed, it is highly probable that if Dupin, Fleury, and Father Favré, did not alter their opinion, it was owing to a firm persuasion that they had committed no error.

PETIT (John Lewis), an eminent surgeon, born at Paris in 1674. He had so early an inclination to

surgery, that Mr Littre, a celebrated anatomist, being in his father's house, he regularly attended that gentleman's lectures, from his being seven years of age. He was received master in surgery in the year 1700; and acquired such reputation in the practice of that art, that in 1726 the king of Poland sent for him to his court, and in 1734 the king of Spain prevailed on him to go into that kingdom. He restored the health of those princes; and they endeavoured to detain him by offering him great advantages, but he chose rather to return to France. He was received into the academy of sciences in 1715; became director of the royal academy of surgery; made several important discoveries; and invented new instruments for the improvement of surgery. He died at Paris in 1750. He wrote an excellent Treatise on the Diseases of the Bones, the best edition of which is that of 1723; and many learned Dissertations in the Memoirs of the Academy of Sciences, and in the first volume of the Memoirs of Surgery.

PETITIO PRINCIPII, in logic, the taking a thing for true, and drawing conclusions from it as such, when it is really false; or at least wants to be proved before any inferences can be drawn from it.

PETITION, a supplication made by an inferior to a superior, and especially to one having jurisdiction. It is used for that remedy which the subject hath to help a wrong done by the king, who hath a prerogative not to be sued by writ: In which sense it is either general, That the king do him right; whereupon follows a general indorsement upon the same, *Let right be done the party*: Or it is special, when the conclusion and indorsement are special, for this or that to be done, &c.

By statute, the soliciting, labouring, or procuring the putting the hands or consent of above twenty persons to any petition to the king or either house of parliament, for alterations in church or state, unless by assent of three or more justices of the peace of the county, or a majority of the grand jury at the assizes or sessions, &c. and repairing to the king or parliament to deliver such petition with above the number of ten persons, is subject to a fine of 100 l. and three months imprisonment, being proved by two witnesses within six months, in the court of B. R. or at the assizes, &c. And if what is required by this statute be observed, care must be taken that petitions to the king contain nothing which may be interpreted to reflect on the administration; for if they do, it may come under the denomination of a libel: and it is remarkable, that the petition of the city of London for the sitting of a parliament was deemed libellous, because it suggested that the king's dissolving a late parliament was an obstruction of justice; also the petition of the seven bishops, sent to the Tower by James II. was called a libel, &c. To subscribe a petition to the king, to frighten him into a change of his measures, intimating, that if it be denied many thousands of his subjects will be discontented, &c. is included among the contempts against the king's person and government, tending to weaken the same, and is punishable by fine and imprisonment.

PETIFORY ACTION, in Scots law. See LAW, N^o clxxxiii, 18. 20.

PETITOT (John), a curious painter in enamel,

was born at Geneva in 1607. He studied the art with such application, that he arrived to a degree of perfection that may almost be accounted inimitable. He was wonderfully patient in finishing his works, though he had the address to conceal his labour: however, he only painted the heads and hands of the figures: the hair, grounds, and drapery, being executed by Bordier his brother-in-law. These two artists had the credit of associating and labouring together for fifty years, without the least misunderstanding happening between them. It is asserted by an ingenious French writer, that Petitot and Bordier derived the knowledge of the most curious and durable colours proper for enamelling, from Sir Theodore Mayerne at London, who recommended Petitot to Charles I. He had the honour to paint the portraits of that monarch and the whole royal family, and continued in England until Charles's unhappy end: he then went to Paris, where he was highly favoured by Louis XIV. and acquired an ample fortune. Being a Protestant, the revocation of the edict of Nantz obliged him to retire to Geneva; but settling soon after at Veray in the canton of Bern, he passed the remainder of his life in ease and affluence. He died in 1691; and had 17 children: of whom one took to painting, and settled at London, where he gained good reputation; but was much inferior to his father.

Petitot may be called the inventor of painting portraits in enamel. Though his friend Bordier made several attempts before him, and Sir Theodore Mayerne had facilitated the means of employing the most beautiful colours; yet Petitot completed the works, which under his hand acquired a softness and liveliness of colouring that will never change, and will ever render his works valuable. He made use of gold and silver plates, and seldom enamelled on copper. When he first came in vogue, his price was 20 louis's a head, which he soon raised to 40. It was his custom to take a painter with him, who painted the picture in oil; after which Petitot sketched out his work, which he always finished after the life. When he painted the king of France, he took those pictures for his copies that most resembled him; and the king afterwards gave him a sitting or two to finish his work.

PETIVERIA, in botany: A genus of the tetragynia order, belonging to the hexandria class of plants; and in the natural method ranking under the 12th order, *Holorææ*. The calyx is tetraphyllous; there is no corolla; and but one seed, with reflexed awns at the top.

PETRA (Cæsar, Lucian), a town of Greece, on the coast of Illyricum, near Dyrrhachium, and not far from the mouth of the river Panyasus.—Another PETRA, (Livy); a town of Mædica, a district of Thrace, lying towards Macedonia; but in what part of Macedonia, he does not say.

PETRA (Ptolemy), *Petræa* (Silius Italicus), *Petrina* (Italicus), in both which last *urbis* is understood; an inland town of Sicily, to the south-west of Enghyum, Now *Petraglia* (Cluverius).

PETRA *jeckuel* (2 Kings xiv.), a town of the Amalekites; near the Adscensus Scorpionis (Judges i.) and the valley of Salt in the south of Judæa: afterwards in the possession of the Edomites, after destroying the Amalekites.

PETRA *Rekem*, or *Rekem*, so called from *Rekem* king of the Midianites, slain by the Israelites (Num. xxvi.) Formerly called *Aræe*, now *Petra*; the capital of Arabia *Petræa* (Josephus). Ptolemy places it in Long. 66. 45. from the Fortunate Islands, and Lat. 30. 20. It declines therefore 80 miles to the south of the parallel of Jerusalem, and 36 miles, more or less, from its meridian to the east. Josephus says, that the mountain on which Aaron died stood near Petra; which Strabo calls the capital of the Nabatæi; at the distance of three or four days journey from Jericho. This Petra seems to be the Sela of Isaiah xvi. 1. and xlii. 11. the Hebrew name of *Petra* "a rock;" Though some imagine Petra to be no older than the time of the Macedonians.

PETRARCH (Francis), a celebrated Italian poet, was born at Arezzo in 1304, and was the son of Petrarco di Parenzo. He studied grammar, rhetoric, and philosophy; for four years at Carpentras; from whence he went to Montpellier, where he studied the law under John Andreas and Cino of Pistoia, and probably from the latter received a taste for Italian poetry. As Petrarch only studied the law out of complaisance to his father, who on his visiting him at Bologna had thrown into the fire all the Latin poets and orators except Virgil and Cicero; he, at 22 years of age, hearing that his father and mother were dead of the plague at Avignon, returned to that city to settle his domestic affairs, and purchased a country-house in a very solitary but agreeable situation, called *Vaucluse*; where he first knew the beautiful Laura, with whom he fell in love, and whom he has immortalised in his poems. He at length travelled into France, the Netherlands, and Germany; and at his return to Avignon entered into the service of Pope John XXII. who employed him in several important affairs. Petrarch was in hopes of being raised to some considerable posts: but being disappointed, he applied himself entirely to poetry; in which he met with such applause, that in one and the same day he received letters from Rome and the chancellor of the university of Paris, by which they invited him to receive the poetic crown. By the advice of his friends, he preferred Rome to Paris, and received that crown from the senate and people on the 8th of April 1341. "The ceremony of his coronation (says Gibbon) was performed in the Capitol, by his friend and patron the supreme magistrate of the republic. Twelve patrician youths were arrayed in scarlet; six representatives of the most illustrious families, in green robes, with garlands of flowers, accompanied the procession; in the midst of the princes and nobles, the senator, count of Anguillara, a kinsman of the Colonna, assumed his throne; and at the voice of an herald Petrarch arose. After discoursing on a text of Virgil, and thrice repeating his vows for the prosperity of Rome, he knelt before the throne, and received from the senator a laurel crown, with a more precious declaration, 'This is the reward of merit.' The people shouted, 'Long life to the Capitol and the poet!' A sonnet in praise of Rome was accepted as the effusion of genius and gratitude; and after the whole procession had visited the Vatican, the profane wreath was suspended before the shrine of St Peter. In the act or diploma which was presented to Petrarch, the

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title and prerogatives of poet-laureat are revived in the Capitol after the lapse of 1300 years; and he receives the perpetual privilege of wearing, at his choice, a crown of laurel, ivy, or myrtle; of assuming the poetic habit; and of teaching, disputing, interpreting, and composing, in all places whatsoever, and on all subjects of literature. The grant was ratified by the authority of the senate and people; and the character of citizen was the recompense of his affection for the Roman name. They did him honour, but they did him justice. In the familiar society of Cicero and Livy, he had imbibed the ideas of an ancient patriot; and his ardent fancy kindled every idea to a sentiment, and every sentiment to a passion." His love of solitude at length induced him to return to Vaucluse; but, after the death of the beautiful Laura, Provence became insupportable to him, and he returned to Italy in 1352; when, being at Milan, Galeas Visconti made him counsellor of state. Petrarch spent almost all the rest of his life in travelling to and from the different cities in Italy. He was archdeacon of Parma, and canon of Padua; but never received the order of priesthood. All the princes and great men of his time gave him public marks of their esteem; and while he lived at Arequa, three miles from Padua, the Florentines deputed Boccace to go to him with letters, by which they invited him to Florence, and informed him, that they restored to him all the estate of which his father and mother had been deprived during the dissensions between the Guelphs and Ghibelines. He died a few years after at Arequa, in 1374. He wrote many works that have rendered his memory immortal; these have been printed in four volumes folio. His life has been written by several authors. Amongst these there was one by Mrs Susanna Dobson, in 2 volumes 8vo, collected and abridged from the French. In this work we have the following elegant and just character of Petrarch.

"Few characters, perhaps, have set in a stronger light the advantage of well-regulated dispositions than that of Petrarch, from the contrast we behold in one particular of his life, and the extreme misery he suffered from the indulgence of an affection, which, though noble and delightful when justly placed, becomes a reproach and a torment to its possessor when once directed to an improper object. For, let us not deceive ourselves or others; though (from the character of Laura) they are acquitted of all guilt in their personal intercourse, yet, as she was a married woman, it is not possible, on the principles of religion and morality, to clear them from that just censure which is due to every defection of the mind from those laws which are the foundation of order and peace in civil society, and which are stamped with the sacred mark of divine authority.

"In this particular of his character, therefore, it is sincerely hoped that Petrarch will serve as a warning to those unhappy minds, who, partaking of the same feelings under the like circumstances, but not yet suffering his misery, may be led, by the contemplation of it, by a generous regard to the honour of human nature, and by a view to the approbation of that all-seeing Judge who penetrates the most secret recesses of the heart, to check every unhappy inclination in its birth, and destroy, while yet in their power,

the seeds of those passions which may otherwise destroy them.

"As to the cavils or censures of those who, incapable of tenderness themselves, can neither enjoy the view of it when presented in its most perfect form, nor pity its sufferings when, as in this work, they appear unhappily indulged beyond the bounds of judgment and tranquillity; to such minds I make no address, well convinced, that, as no callous heart can enjoy, neither will it ever be in danger of being misled, by the example of Petrarch in this tender but unfortunate circumstance of his character.

"To susceptible and feeling minds alone Petrarch will be ever dear. Such, while they regret his failings, and consider them as warnings to themselves, will love his virtues; and, touched by the glowing piety and heart-felt contrition which often impressed his soul, will ardently desire to partake with him in those pathetic and sublime reflections which are produced in grateful and affectionate hearts, on reviewing their own lives, and contemplating the works of God.

"Petrarch had received from nature a very dangerous present. His figure was so distinguished as to attract universal admiration. He appears, in his portraits, with large and manly features, eyes full of fire, a blooming complexion, and a countenance that bespoke all the genius and fancy which shone forth in his works. In the flower of his youth, the beauty of his person was so very striking, that wherever he appeared, he was the object of attention. He possessed an understanding active and penetrating, a brilliant wit, and a fine imagination. His heart was candid and benevolent, susceptible of the most lively affections, and inspired with the noblest sentiments of liberty.

"But his failings must not be concealed. His temper was, on some occasions, violent, and his passions headstrong and unruly. A warmth of constitution hurried him into irregularities, which were followed with repentance and remorse.—No essential reproach, however, could be cast on his manners, till after the 23d year of his age. The fear of God, the thoughts of death, the love of virtue, and those principles of religion which were inculcated by his mother, preserved him from the surrounding temptations of his earlier life."

A resemblance has been traced, in several instances, between this admired poet and our late famous Yorick.—Both, we know, had great wit and genius, and no less imprudence and eccentricity; both were canons, or prebendaries, the Italian of Padua, &c. and the Englishman of York; they both "ran over France, without any business there." If the bishop of Lombes patronised and corresponded with the one, a prelate of the English church, now deceased, desired, in a letter, to *bandy* || with the other. In their attachments to Laura and Eliza, both married women, these two prebendaries were equally warm, and equally innocent. And, even after death, a most remarkable circumstance has attended them both; some persons, as we are told, stole Petrarch's bones, in order to sell them; and, in like manner, Yorick's body, it is confidently affirmed, was also stolen, and his skull has been exhibited at Oxford.

PETRE, or SALTPETRE, in chemistry. See CHEMISTRY, no 724, &c.

PETREA, in botany: A genus of the angiospermia order, belonging to the didynamia class of plants; and in the natural method ranking under the 4th order, *Perfonate*. The calyx is quinquepartite, very large, and coloured; the corolla rotaceous; the capsule bilocular, and situated in the bottom of the calyx; the seeds solitary. There is only one species, a native of New Spain. It rises to the height of 15 or 16 feet, with a woody stalk covered with grey bark, sending out several long branches. These have a whiter bark than the stem, and are garnished with leaves at each joint, which, on the lower part of the branches, are placed by three round them; but, higher up, they are rough, and have a rough surface. The flowers are produced at the ends of the branches, in loose bunches nine or ten inches long, each flower standing on a slender flower-stalk about an inch long: the empalement of the flower is composed of five narrow obtuse leaves about an inch long, which are of a fine blue colour, and much more conspicuous than the petals, which are white, and not more than half the length of the empalement. The plant is propagated by seeds procured from the places where they are natives, and of which very few are good; for though Dr Houston, the discoverer of the plant, sent parcels of seeds to several persons in England, only two plants were produced from the whole. The seeds must be sown in a good hot-bed; and when the plants come up, they should all be planted in a separate small pot filled with light loamy earth, and plunged into a hot-bed of tanners bark, where they should afterwards constantly remain.

PETREL, in ornithology. See PROCELLARIA.

PETRIDIA, in natural history, a genus of scrupi, of a plain, uniform texture; of no great variety of colours, and emulating the external form of pebbles.

PETRIFICATION, in physiology, denotes the conversion of wood, bones, and other substances, principally animal or vegetable, into stone. These bodies are more or less altered from their original state, according to the different substances they have lain buried among in the earth; some of them having suffered very little change, and others being to highly impregnated with crystalline, sparry, pyritical, or other extraneous matter, as to appear mere masses of stone or lumps of the matter of the common pyrites; but they are generally of the external dimensions, and retain more or less of the internal figure, of the bodies into the pores of which this matter has made its way. The animal substances thus found petrified are chiefly sea-shells; the teeth, bony palates, and bones, of fish; the bones of land-animals, &c. These are found variously altered, by the insinuation of stony and mineral matter into their pores; and the substance of some of them is now wholly gone, there being only stony, sparry, or other mineral matter remaining in the shape and form.

Respecting the manner in which petrification is accomplished, we know but little. It has been thought by many philosophers, that this was one of the rare processes of nature; and accordingly such places as afforded a view of it, have been looked upon as great curiosities. However, it is now discovered, that pe-

trification is exceedingly common; and that every kind of water carries in it some earthy particles, which being precipitated from it, become stone of a greater or lesser degree of hardness; and this quality is most remarkable in those waters which are much impregnated with selenitic matter. Of late, it has also been found by some observations on a petrification in East Lothian in Scotland, that iron contributes greatly to the process: and this it may do by its precipitation of any aluminous earth which happens to be dissolved in the water by means of an acid; for iron has the property of precipitating this earth, though it cannot precipitate the calcareous kind. The calcareous kinds of earth, however, by being soluble in water without any acid, must contribute very much to the process of petrification, as they are capable of a great degree of hardness by means only of being joined with fixed air, on which depends the solidity of our common cement or mortar used in building houses.

The name *petrification* belongs only, as we have seen, to bodies of vegetable or animal origin; and in order to determine their class and genus, or even species, it is necessary that their texture, their primitive form, and in some measure their organization, be still discernible. Thus we ought not to place the stony kernels, moulded in the cavity of some shell, or other organized body, in the rank of petrifications properly so called.

Petrifications of the vegetable kingdom are almost all either gravelly or siliceous; and are found in gullies, trenches, &c. Those which strike fire with steel are principally found in sandy fissures; those which effervesce in acids are generally of animal origin, and are found in the horizontal beds of calcareous earth, and sometimes in beds of clay or gravel; in which case the nature of the petrification is different. As to the substances which are found in gypsum, they seldom undergo any alteration, either with respect to figure or composition, and they are very rare.

Organized bodies, in a state of petrification, generally acquire a degree of solidity of which they were not possessed before they were buried in the earth, and some of them are often fully as hard as the stones or matrices in which they are enveloped. When the stones are broken, the fragments of petrifications are easily found, and easily distinguished. There are some organized bodies, however, so changed by petrification, as to render it impossible to discover their origin. That there is a matter more or less agitated, and adapted for penetrating bodies, which crumbles and separates their parts, draws them along with it, and disperses them here and there in the fluid which surrounds them, is a fact of which nobody seems to entertain any doubt. Indeed we see almost every substance, whether solid or liquid, intently consume, diminish in bulk, and at last, in the lapse of time, vanish and disappear.

A petrified substance, strictly speaking, is nothing more than the skeleton, or perhaps image, of a body which has once had life, either animal or vegetable, combined with some mineral. This petrified wood is not in that state wood alone. One part of the compound or mass of wood having been destroyed by local causes, has been compensated by earthy and sandy substances, diluted and extremely minute, which the

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Phil. Trans. v. 69. part 1, p. 55.

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waters surrounding them had deposited while they themselves evaporated. These earthy substances, being then moulded in the skeleton, will be more or less indurated, and will appear to have its figure, its structure, its size, in a word, the same general characters, the same specific attributes, and the same individual differences. Farther, in petrified wood, no vestige of ligneous matter appears to exist. We know that common wood is a body in which the volume of solid parts is greatly exceeded by that of the pores. When wood is buried in certain places, lapidific fluids, extremely divided and sometimes coloured, insinuate themselves into its pores and fill them up. These fluids are afterwards moulded and condensed. The solid part of the wood is decomposed and reduced into powder, which is expelled without the mass by aqueous filtrations. In this manner, the places which were formerly occupied by the wood are now left empty in the form of pores. This operation of nature produces no apparent difference either of the size or of the shape; but it occasions, both at the surface and in the inside, a change of substance, and the ligneous texture is inverted; that is to say, that which was pore in the natural wood, becomes solid in that which is petrified; and that which was solid or full in the first state, becomes porous in the second. In this way, says M. Musard, petrified wood is much less extended in pores than solid parts, and at the same time forms a body much more dense and heavy than the first. As the pores communicate from the circumference to the centre, the petrification ought to begin at the centre, and end with the circumference of the organic body subjected to the action of the lapidific fluids. Such is the origin of petrifications. They are organized bodies which have undergone changes at the bottom of the sea or the surface of the earth, and which have been buried by various accidents at different depths under the ground.

In order to understand properly the detail of the formation of petrified bodies, it is necessary to be well acquainted with all their constituent parts. Let us take wood for an example. Wood is partly solid and partly porous. The solid parts consist of a substance, hard, ligneous, and compact, which forms the support of the vegetable; the porous parts consist of vessels or interstices which run vertically and horizontally across the ligneous fibres, and which serve for conducting air, lymph, and other fluids. Among these vessels, the tracheæ which rise in spiral forms, and which contain only air, are easily distinguished. The cylindric vessels, some of which contain lymph, and others the *succus proprius*, are full only during the life of the vegetable. After its death they become vacant by the evaporation and absence of the fluids with which they were formerly filled. All these vessels, whether ascending or descending, unite with one another, and form great cavities in the wood and in the bark. According to Malpighi and Duhamel, the ligneous fibres are themselves tubular, and afford a passage to certain liquors; in short, the wood and bark are interspersed with utriculi of different shapes and sizes. The augmentation of the trunk in thickness, according to Malpighi, is accomplished by the annual addition of a new exterior covering of fibres and of tracheæ. Others think that a concentric layer of sap-wood is

every year hardened, whilst a new one is forming from the bark. But it is on all sides agreed that the concentric layers of wood are distinct from one another, because at the point of contact betwixt any two of them, the new vessels, as well as new fibres, are more apparent and perceptible than they are in any other place. Having made these preliminary remarks on the structure of vegetables, we shall now proceed to give an abridged account of the manner in which M. Mongez explains their petrification.

In proportion to the tenderness and bad quality of wood, it imbibes the greater quantity of water; therefore this sort will unquestionably petrify more easily than that which is hard. It is thought that all the petrified wood so often found in Hungary has been originally soft, such as firs or poplars. Suppose a piece of wood buried in the earth; if it be very dry, it will suck up the moisture which surrounds it like a sponge. This moisture, by penetrating it, will dilate all the parts of which it is composed. The tracheæ, or air-vessels, will be filled first, and then the lymphatic vessels and those which contain the *succus proprius*, as they are likewise empty. The water which forms this moisture keeps in dissolution a greater or a less quantity of earth; and this earth, detached, and carried along in its course, is reduced to such an attenuated state, that it escapes our eyes and keeps itself suspended, whether by the medium of fixed air or by the motion of the water. Such is the lapidific fluid. Upon evaporation, or the departure of the menstruum, this earth, sand, or metal, again appears in the form of precipitate or sediment in the cavities of the vessels, which by degrees are filled with it. This earth is there moulded with exactness: The lapse of time, the simultaneous and partial attraction of the particles, make them adhere to one another; the lateral suction of the surrounding fibres, the obstruction of the moulds, and the hardening of the moulded earth, become general; and there consists nothing but an earthy substance which prevents the sinking of the neighbouring parts. If the deposit is formed of a matter in general pretty pure, it preserves a whiter and clearer colour than the rest of the wood; and as the concentric layers are only perceptible and distinct in the wood, because the vessels are there more apparent on account of their size, the little earthy cylinders, in the state of petrified wood, must be there a little larger, and consequently must represent exactly the turnings and separations of these layers. At the place of the utriculi, globules are observed, of which the shapes are as various as the moulds wherein they are formed. The anastomoses of the proper and lymphatic vessels, form besides points of support or reunion for this stony substance.

With regard to holes formed by worms in any bits of wood, before they had been buried in the earth, the lapidific fluid, in penetrating these great cavities, deposits there as easily the earthy sediment, which is exactly moulded in them. These vermiform cylinders are somewhat less in bulk than the holes in which they are found, which is owing to the retreat of the more refined earth and to its drying up.

Let any one represent to himself this collection of little cylinders, vertical, horizontal, inclined in different directions, the stony masses of utriculi and anastomoses,

tomoses, and he will have an idea of the stony substance which forms the ground-work of petrification. Hitherto not a single ligneous part is destroyed; they are all existing, but surrounded on every side with earthy deposits; and that body which, during life, was composed of solid and of empty parts, is now entirely solid: its destruction and decomposition do not take place till after the formation of these little deposits. In proportion as the water abandons them, it penetrates the ligneous substance, and destroys it by an insensible fermentation. The woody fibres being decomposed, form in their turn voids and interstices, and there remains in the whole piece nothing but little stony cylinders. But in proportion as these woody fibres disappear, the surrounding moisture, loaded with earth in the state of dissolution, does not fail to penetrate the piece of wood, and to remain in its new cavities. The new deposit assumes exactly the form of decomposed fibres; it envelopes in its turn the little cylinders which were formed in their cavities, and ends by incorporating with them. We may suppose here, that in proportion as it decomposes, there is a reaction of the ligneous part against the lapidific fluid: from this reaction a colour arises which stains more or less the new deposit; and this colour will make it easily distinguishable from that which has been laid in the inside of the vessels. In all petrified wood this shade is generally perceptible.

We have then, says M. Mongez, four distinct epochs in the process by which nature converts a piece of wood into stone, or, to speak more justly, by which she substitutes a stony deposit in its place: 1. Perfect vegetable wood, that is to say, wood composed of solid and of empty parts, of ligneous fibres, and of vessels. 2. Wood having its vessels obstructed and choaked up by an earthy deposit, while its solid parts remain unaltered. 3. The solid parts attacked and decomposed, forming new cavities betwixt the stony cylinders, which remain in the same state, and which support the whole mass. 4. These new cavities filled with new deposits, which incorporate with the cylinders, and compose nothing else but one general earthy mass representing exactly the piece of wood.

Among the petrifications of vegetables called *dendrolites*, are found parts of thrubs, stems, roots, portions of the trunk, some fruits, &c. We must not, however, confound the impressions of mosses, ferns, and leaves, nor incrustations, with petrifications.

Among the petrifications of animals, we find shells, crustaceous animals, polyparii, some worms, the bony parts of fishes and of amphibious animals, few or no real insects, rarely birds and quadrupeds, together with the bony portions of the human body. The cornua ammonis are petrified serpents; and with regard to figured and accidental bodies, these are *lusus nature*.

In order, says M. Bertrand, in his *Dictionnaire des Fossiles*, that a body should become petrified, it is necessary that it be, 1. Capable of preservation under ground: 2. That it be sheltered from the air and running water (the ruins of Herculaneum prove that bodies which have no connection with free air, preserve themselves untouched and entire). 3. That it be secured from corrosive exhalations. 4. That it be in a place where there are vapours or liquids, loaded either with metallic or stony particles in a state of dissolution,

and which, without destroying the body, penetrate it, impregnate it, and unite with it in proportion as its parts are dissipated by evaporation.

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It is a question of great importance among naturalists, to know the time which Nature employs in petrifying bodies of an ordinary size.—It was the wish of the late emperor, Duke of Lorraine, that some means should be taken for determining this question. M. le Chevalier de Baillu, director of the cabinet of natural history of his imperial majesty, and some other naturalists, had, several years ago, the idea of making a research which might throw some light upon it. His imperial majesty being informed by the unanimous observations of modern historians and geographers, that certain pillars which are actually seen in the Danube in Gervia, near Belgrade, are remains of the bridge which Trajan constructed over that river, presumed that these pillars having been preserved for so many ages behoved to be petrified, and that they would furnish some information with regard to the time which nature employs in changing wood into stone. The emperor thinking this hope well founded, and wishing to satisfy his curiosity, ordered his ambassador at the court of Constantinople to ask permission to take up from the Danube one of the pillars of Trajan's bridge. The petition was granted, and one of the pillars was accordingly taken up; from which it appeared that the petrification had only advanced three fourths of an inch in the space of 1500 years. There are, however, certain waters in which this transmutation is more readily accomplished.—Petrifications appear to be formed more slowly in earths that are porous and in a slight degree moist than in water itself.

When the foundations of the city of Quebec in Canada were dug up, a petrified savage was found among the last beds to which they proceeded. Although there was no idea of the time at which this man had been buried under the ruins, it is however true, that his quiver and arrows were still well preserved. In digging a lead-mine in Derbyshire in 1744, a human skeleton was found among stags horns. It is impossible to say how many ages this carcase had lain there. In 1695 the entire skeleton of an elephant was dug up near Tonna in Thuringia. Some time before this epoch the petrified skeleton of a crocodile was found in the mines of that country. We might cite another fact equally curious which happened at the beginning of the last century. John Munte, curate of Skergarp in Scania, and several of his parishioners, wishing to procure turf from a drained marshy soil, found, some feet below ground, an entire cart with the skeletons of the horses and carter. It is presumed that there had formerly been a lake in that place, and that the carter attempting to pass over on the ice, had by that means probably perished. In fine, wood partly fossil and partly coaly has been found at a great depth, in the clay of which tile was made for the Abbey of Fontenay. It is but very lately that fossil wood was discovered at the depth of 75 feet in a well betwixt Issi and Vauvres near Paris. This wood was in sand betwixt a bed of clay and pyrites, and water was found four feet lower than the pyrites. M. de Laumont, inspector general of the mines, says (*Journal de Physique*, Mai 1736), that in the lead-mine at Pontpierre near Rennes, is a fissure, perhaps the only one of its kind. In that fissure, sea-

shells

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tion.

shells, rounded pebbles, and an entire beech, have been found 240 feet deep. This beech was laid horizontally in the direction of the fissure. Its bark was converted into pyrites, the sap-wood into jet, and the centre into coal.

A great many pieces of petrified wood are found in different counties of France and Savoy. In Cobourg in Saxony, and in the mountains of Misnia, trees of a considerable thickness have been taken from the earth, which were entirely changed into a very fine agate, as also their branches and their roots. In sawing them, the annual circles of their growth have been distinguished. Pieces have been taken up, on which it was distinctly seen that they had been gnawed by worms; others bear visible marks of the hatchet. In fine, pieces have been found which were petrified at one end, while the other still remained in the state of wood fit for being burned. It appears then that petrified wood is a great deal less rare in nature than is commonly imagined.

Cronstedt has excluded petrifications from any place in the body of his system of mineralogy, but takes notice of them in his appendix. He distinguishes them by the name of *Mineralia Larvata*, and defines them to be "mineral bodies in the form of animals or vegetables." The most remarkable observations concerning them, according to Mr Kirwan, who differs in some particulars from Mongez, are as follow. 1. Those of shells are found on or near the surface of the earth; those of fish deeper; and those of wood deeper still. Shells in substance are found in vast quantities, and at considerable depths. 2. The substances most susceptible of petrification are those which most resist the putrefactive process; of which kind are shells, the harder kinds of wood, &c.; while the softer parts of animals, which easily putrefy, are seldom met with in a petrified state. 3. They are most commonly found in strata of marl, chalk, limestone, or clay: seldom in sandstone, still more seldom in gypsum; and never in gneiss, granite, basalt, or schorl. Sometimes they are found in pyrites, and ores of iron, copper, and silver; consisting almost always of that kind of earth or other mineral which surrounds them; sometimes of flint, agate, or cornelian. 4. They are found in climates where the animals themselves could not have existed. 5. Those found in slate or clay are compressed and flattened.

The different species of petrifications, according to Cronstedt, are,

1. *Terra Larvata*; extraneous bodies changed into a limy substance or calcareous changes. These are, 1. Loose or friable. 2. Indurated. The former are of a chalky nature in form of vegetables or animals; the second filled with solid limestone in the same forms. Some are found entirely changed into a calcareous spar. All of them are found in France, Sweden, and other countries in great plenty.

On these petrifications Cronstedt observes, that shells and corals are composed of limy matter even when still inhabited by their animals, but they are classed among the petrifications as soon as the calcareous particles have obtained a new arrangement; for example, when they have become sparry; filled with calcareous earth either hardened or loose, or when they lie in the strata of the earth. "These, says he, form the greatest part of the fossil collections which are so industriously made, often

without any regard to the principal and only use they can be of, viz. that of enriching zoology. Mineralogists are satisfied with seeing the possibility of the changes the limestone undergoes in regard to its particles; and also with receiving some insight into the alteration which the earth has been subject to from the state of the strata which are now found in it." The calcined shells, where the petrifications are of a limy or chalky nature, answer extremely well as a manure; but the indurated kind serve only for making grottoes. Gypseous petrifications are extremely rare; however, Chardin informs us that he had seen a lizard inclosed in a stone of that kind in Persia.

II. *Larvæ*; or bodies changed into a stony substance. These are all indurated, and are of the following species. 1. Cornelians in form of shells from the river Tomm in Siberia. 2. Agate in form of wood; a piece of which is said to be in the collection of the Count de Tessin. 3. Coralloids of white flint (*Millepora*) found in Sweden. 4. Wood of yellow flint found in Italy, in Turkey near Adrianople, and produced by the waters of Lough-neagh in Ireland.

III. *Larvæ Argillacea*; where the bodies appear to be changed into clay. These are found either loose and friable, or indurated. Of the former kind is a piece of porcelain clay met with in a certain collection, with all the marks of the root of a tree upon it. Of the latter kind is the osteocolla; which is said to be the roots of the poplar-tree changed, and not to consist of any calcareous substance. A sort of fossil ivory, with all the properties of clay, is said likewise to be found in some places.

IV. *Larvæ Infusile*; where the substances are impregnated with great quantities of salts. Human bodies have been twice found impregnated with vitriol of iron in the mine of Falun, in the province of Dalarna in Sweden. One of them was kept for several years in a glass case, but at last began to moulder and fall to pieces. Turf and roots of trees are likewise found in water strongly impregnated with vitriol. They do not flame, but look like a coal in a strong fire; neither do they decay in the air.

V. Bodies penetrated by mineral inflammable substances. 1. By pit-coal, such as wood; whence some have imagined coal to have been originally produced from wood. Some of these substances are fully saturated with the coaly matter; others not. Among the former Cronstedt reckons jet; among the latter the substance called *mumia vegetabilis*, which is of a loose texture, resembling amber, and may be used as such. 2. Those penetrated by asphaltum or rock-oil. The only example of these given by our author is a kind of turf in the province of Skone in Sweden. The Egyptian mummies, he observes, cannot have any place among this species, as they are impregnated artificially with asphaltum, in a manner similar to what happens naturally with the wood and coaly matter in the last species. 3. Those impregnated with sulphur which has dissolved iron, or with pyrites. Human bodies, bivalve and univalve shells and insects, have been all found in this state; and the last are found in the alum slate at Andrarum, in the province of Skone in Sweden.

VI. *Larvæ metallifera*; where the bodies are impregnated with metals. These are, 1. Covered with native silver; which is found on the surface of shells

in England. 2. Where the metal is mineralised with copper and sulphur. Of this kind is the fahlertz or grey silver ore, in the shape of ears of corn, and supposed to be vegetables, found in argillaceous slate at Frankenberg and Tahlitteren in Hesse. 3. *Larve cuprifera*, where the bodies are impregnated with copper. To this species principally belong the Turquoise or Turkey stones, improperly so called; being ivory and bones of the elephant or other animals impregnated with copper. See TURQUOISE. At Simore in Languedoc there are bones of animals dug up, which, during calcination, assume a blue colour; but according to Cronstedt it is not probable that these owe their colour to copper. 3. With mineralised copper. Of these our author gives two examples. One is where the copper is mineralised with sulphur and iron, forming a yellow mineral ore. With this some shells are impregnated which lie upon a bed of loadstone in Norway. Other petrifications of this kind are found in the form of fish in different parts of Germany. The other kind is where the copper is impregnated with sulphur and silver. Of this kind is the grey silver ore, like ears of corn, found in the slate quarries at Hesse. 4. *Larve ferruginea*, with iron in form of a calx, which has assumed the place or shape of extraneous bodies. These are either loose or indurated. Of the loose kind are some roots of trees found at the lake Langelmä in Finland. The indurated kinds are exemplified in some wood found at Orbissan in Bohemia. 5. Where the iron is mineralised, as in the pyritaceous larvæ, already described.

VII. Where the bodies are tending to decomposition, or in a way of destruction. Among these, our author enumerates MOULD and TURF, which see; as also CEMENT, MORTAR, ROCK, SAND, SELENITE, STONE, and WATER. See likewise the article FOSSIL, Plates CC and CCI, and MOUNTAIN.

We shall add the following description of a very curious animal petrification. The Abbé de Sauvages, celebrated for his refined taste and knowledge in natural history, in a tour through Languedoc, between Alais and Uzès, met with a narrow vein of no more than two toises wide, which crosses the road, and is bordered on one side by a grey dirty soil, and on the other by a dry sandy earth, each of a vast extent, and on a level with the narrow vein which separates them. In this narrow vein only are contained petrified shells, cemented together by a whitish marl. They are in prodigious plenty; among which there is one species which the Abbé does not remember to have known to have been anywhere described, and may probably be a new acquisition to natural history.

This shell has the shape of a horn, somewhat incurved towards the base. (See figure 9. Plate CCCLXXXVIII.) It seems composed of several cups, let into each other, which are sometimes found separate. They have all deep channels, which extend, as in many other shells, from the base to the aperture; the projecting ribs which form these channels are mostly worn away, being rarely to be found entire. Sometimes several are grouped together; and as a proof that they are not a fortuitous assemblage caused by the petrification, they are fixed together through their whole length, in such sort, that their base and aperture are regularly turned the same way. The Abbé should

have referred this to the genus which Linnæus and the Marquis d'Argenville named *dentaria*, had they not been let into each other. He found some of these whose aperture or hollow was not stopped up by the petrification, and seemed as cones adapted to one another (fig. 10.), forming a row of narrow cells, separated by a very thin partition: this row occupied not more than one half of the cavity of the shell.

Our article has already extended to such a length as to preclude any further additions: we cannot, however, finish it without observing, that fossil bones are very common in Dalmatia. They are of various kinds, and in their nature, apparently very extraordinary; but we have found no tolerable account or probable conjecture of their origin. Vitaliano Donati of Padua, in his *Saggio sopra la storia naturale dell' Adriatico*, was the first who took notice of them; and Fortis, in his travels into Dalmatia, has given a copious account of them. They are most common in the islands of *Cherso* and *Osero*. See Fortis's Travels into Dalmatia, page 440—465, and our article VITALIANO.

PETRIFIED CITY. The story of a petrified city is well known all over Africa, and has been believed by many considerable persons even in Europe. Louis XIV. was so fully persuaded of its reality, that he ordered his ambassador to procure the body of a man petrified from it at any price. Dr Shaw's account of this affair is as follows: "About 40 years ago (now more than 70), when M. le Maire was the French consul at Tripoli, he made great inquiries, by order of the French court, into the truth of the report concerning a petrified city at Râs Sem; and amongst other very curious accounts relating to this place, he told me a remarkable circumstance, to the great discredit, and even confutation, of all that had been so positively advanced with regard to the petrified bodies of men, children, and other animals.

"Some of the janizaries, who, in collecting tribute, traverse the district of Ras Sem, promised him, that, as an adult person would be too cumbersome, they would undertake, for a certain number of dollars, to bring him from thence the body of a little child. After a great many pretended difficulties, delays, and disappointments, they produced at length a little Cupid, which they had found, as he learned afterwards, among the ruins of Leptis; and, to conceal the deceit, they broke off the quiver, and some other of the distinguishing characteristics of that deity. However, he paid them for it, according to promise, 1000 dollars, which is about 150 l. sterling of our money, as a reward for their faithful service and hazardous undertaking; having run the risk, as they pretended, or being strangled if they should have been discovered in thus delivering up to an infidel one of those unfortunate Mahometans, as they take them originally to have been.

"But notwithstanding this cheat and imposition had made the consul desist from searching after the petrified bodies of men and other animals; yet there was one matter of fact, as he told me, which still very strangely embarrassed him, and even strongly engaged him in favour of the current report and tradition. This was some little loaves of bread, as he called them, which had been brought to him from that place. His reasoning, indeed, thereupon, provided the pretended matter of fact had been clear and evident, was just and

Petrified
City.

satisfactory; for where we find loaves of bread, these, as he urged, some persons must have been employed in making them, as well as others for whom they were prepared. One of these loaves he had, among other petrifications, very fortunately brought with him to Cairo, where I saw it, and found it to be an echinites of the discoid kind, of the same fashion with one I had lately found and brought with me from the deserts of Marah. We may therefore reasonably conclude, that there is nothing to be found at Ras Sem, unless it be the trunks of trees, echinites, and such petrifications as have been discovered at other places.

"M. le Maire's inquiries, which we find were supported by the promise and performance of great rewards, have brought nothing further to light. He could never learn that any traces of walls, or buildings, or animals, or utensils, were ever to be seen within the verge of these pretended petrifications. The like account I had from a Sicilian renegade, who was the janizary that attended me whilst I was in Egypt; and as in his earlier years he had been a soldier of Tripoli, he assured me that he had been several times at Ras Sem. This I had confirmed again in my return from the Levant by the interpreter of the British factory at Tunis, who was likewise a Sicilian renegade; and being the liberos or freedman of the bashaw of Tripoli, was preferred by him to be the bey or viceroy of the province of Darna, where Ras Sem was immediately under his jurisdiction. His account was likewise the same; neither had he ever seen, in his frequent journeys over this district, any other petrifications than what are above-mentioned. So that the petrified city, with its walls, castles, streets, shops, cattle, inhabitants, and utensils, were all of them at first the mere inventions of the Arabs, and afterwards propagated by such persons, who, like the Tripoli ambassador, and his friend above mentioned, were credulous enough to believe them.

"However, there is one remarkable circumstance relating to Ras Sem that deserves well to be recorded. When the winds have blown away the billows of sand which frequently cover and conceal these petrifications, they discover, in some of the lower and more depressed places of this district, several little pools of water, which is usually of so ponderous a nature, that, upon drinking it, it passes through the body like quicksilver. This perhaps may be that petrifying fluid which has all along contributed to the conversion of the palm-trees and the echini into stone: for the formation not only of these, but of petrifications of all kinds, may be entirely owing to their having first of all lodged in a bed of loam, clay, sand, or some other proper nidus or matrix, and afterwards gradually been acted upon and pervaded by such a petrifying fluid as we may suppose this to be."

To this account it may not be amiss to subjoin the memorial of Cassim Aga, the Tripoli ambassador at the court of Britain. The city, he says, is situated two days journey south from Onguela, and 17 days journey from Tripoli by caravan to the south-east. "As one of my friends (says the ambassador) desired me to give him in writing an account of what I knew touching the petrified city, I told him what I had heard from different persons, and particularly from the

mouth of one man of credit who had been on the spot: that is to say, that it was a very spacious city, of a round form, having great and small streets therein, furnished with shops, with a vast castle magnificently built: that he had seen there several sorts of trees, the most part olives and palms, all of stone, and of a blue or rather lead colour: that he saw also figures of men in a posture of exercising their different employments; some holding in their hands staves, others bread, every one doing something, even women suckling their children, and in the embraces of their husbands, all of stone: that he went into the castle by three different gates, though there were many more, where he saw a man lying upon a bed of stone: that there were guards at the gates with pikes and javelins in their hands: in short, that he saw in this wonderful city many sorts of animals, as camels, oxen, horses, asses, sheep, and birds, all of stone, and the colour above-mentioned."

We have subjoined this account, because it shows in striking colours the amazing credulity of mankind, and the avidity with which they swallow the marvellous, and the difficulty of discovering the truth respecting places or things at a distance from us.

PETROBRUSSIANS, a religious sect, which had its rise in France and the Netherlands about the year 1110. The name is derived from *Peter Bruys*, a Provençal, who made the most laudable attempt to reform the abuses and remove the superstition that disgraced the beautiful simplicity of the gospel. His followers were numerous; and for 20 years his labour in the ministry was exemplary and unremitted. He was, however, burnt in the year 1130 by an enraged populace set on by the clergy.

The chief of Bruys's followers was a monk named *Henry*; from whom the Petrobrussians were also called *Henricians*. Peter the Venerable, abbot of Clugny, has an express treatise against the Petrobrussians; in the preface to which he reduces their opinions to five heads. 1. They denied that children before the age of reason can be justified by baptism, in regard it is our own faith that saves by baptism. 2. They held that no churches should be built, but that those that already are should be pulled down; an inn being as proper for prayers as a temple, and a stable as an altar. 3. That the cross ought to be pulled down and burnt, because we ought to abhor the instruments of our Saviour's passion. 4. That the real body and blood of Christ are not exhibited in the eucharist, but merely represented by their figures and symbols. 5. That sacrifices, alms, prayers, &c. do not avail the dead. F. Langlois objects Manicheism to the Petrobrussians; and says, they maintained two gods, the one good, the other evil: but this we rather esteem an effect of his zeal for the catholic cause, which determined him to blacken the adversaries thereof, than any real sentiment of the Petrobrussians.

PETROJOANNITES, were followers of Peter John, or Peter Joannis, i. e. Peter the son of John, who flourished in the 12th century. His doctrine was not known till after his death, when his body was taken out of his grave and burnt. His opinions were, that he alone had the knowledge of the true sense wherein the apostles preached the gospel; that the reasonable soul is not the form of man; that there is no grace infused

by

olum. by baptism; and that Jesus Christ was pierced with a lance on the cross before he expired.

PETROLEUM*, or **Rock oil**; a thick oily substance exuding out of the earth, and collected on the surface of wells in many parts of the world. It is found on some in Italy, and in a deserted mine in the province of Dalarna in Sweden. In this last place it collects itself in small hollows of lime stone, like resin in the wood of the pine tree. It is found trickling from the rocks, or issuing from the earth, in many parts of the duchy of Modena, and in various parts of France, Switzerland, Germany, and Scotland, as well as in Asia. It is also found not only on the surface of wells as already mentioned, but mixed with earth and sand, from whence it may be separated by infusion in water. It is of a purgent and acrid taste, and smells like the oil of amber, but more agreeable. It is very light and very pellucid; but, though equally bright and clear under all circumstances, it is liable to a very great variety in its colour. It is naturally almost colourless, and in its appearance greatly resembles the most pure oil of turpentine: this is called *white petroleum*, though it has no more colour than water. It is sometimes tinged of a brownish, reddish, yellowish, or faint greenish colour; but its most frequent colour is a mixture of the reddish and blackish, in such a degree that it looks black when viewed behind the light, but purple when placed between the eye and a candle or window. It is rendered thinner by distillation with water, and leaves a resinous residuum; when distilled with a volatile alkali, the latter acquires the properties of fuccinated ammoniac, and contains the acid of amber. It is the most frequent of all the liquid bitumens, and is perhaps the most valuable of them all in medicine. It is to be chosen the purest, lightest, and most pellucid that can be had, such as is of the most penetrating smell and is most inflammable. Monet informs us that some kinds of it are of the density of nut oil. It is insoluble in spirit of wine; which, though it be the great dissolvent of sulphur, has no effect upon petroleum, not even with ever so long a digestion. It will not take fire with the dephlegmated acid spirits; as oil of cloves and other of the vegetable essential oils do; and in distillation, either by *baneum marie* or in sand, it will neither yield phlegm nor acid spirit; but the oil itself rises in its own form, leaving in the retort only a little matter, thick as honey, and of a brownish colour.

The finer kinds resemble naphtha. Kirwan is of opinion that naphtha is converted into petroleum by a process similar to what takes place in essential oils when exposed to the atmosphere; in which case the oil absorbs not only the pure, but also the phlogisticated, part of the atmosphere, in consequence of which several alterations take place in them.

Mr Bouldoc made several experiments with the white petroleum of Modena; an account of which he gave to the Paris academy.

It easily took fire (A) on being brought near a candle, and that without immediately touching the flame; and when heated in any vessel it will attract the flame of a candle, though placed at a great height above the vessel; and the vapour it sends up taking fire, the flame will be communicated to the vessel of heated liquor, and the whole will be consumed. It burns in the water; and when mixed with any liquor swims on the surface of it, even of the highest rectified spirit of wine, which is $\frac{1}{4}$ th heavier than pure petroleum. It readily mixes with all the essential oils of vegetables, as oil of lavender, turpentine, and the rest, and seems very much of their nature: nor is this very strange, since the alliance between these bodies is probably nearer than is imagined, as the essential oils of vegetables may have been originally mineral ones, and drawn up out of the earth into the vessels of the plants.

The distinguishing characteristic of the petroleum is its thickness, resembling inspissated oil: when pure it is lighter than spirit of wine; but, though ever so well rectified, it becomes in time thick and black as before. Petroleum, when shaken, yields a few bubbles; but they sooner subside than in almost any other liquor, and the liquor resumes its clear state again almost immediately. This seems owing to the air in this fluid being very equally distributed to all its parts, and the liquor being composed of particles very evenly and nicely arranged. This extensibility of the oil is also amazing. A drop of it will spread over several feet of water, and in this condition it gives a great variety of colours; that is, the several parts of which this thin film is composed act as so many prisms. The most severe frost never congeals petroleum into ice; and paper wetted with it becomes transparent as when wetted with oil; but it does not continue so, the paper becoming opaque again in a few minutes as the oil dries away.

There are three varieties of it according to Mongez.

1. The yellow, found at Modena in Italy; very light and volatile. 2. The reddish, or yellowish red; some of which is collected at Gabian in Languedoc and in Alface. 3. The heavy, black, or brown kind, which is the most common, and met with in England, France, Germany, and some other countries. It generally runs out either from chinks or gaps of rocks, or is mixed with the earth, and gushes out of it; or it swims on the water of some fountains, as already mentioned. According to Dr Lippert, a kind of resin is produced by mixing petroleum with smoking nitrous acid. The taste of this substance is very bitter, but the smell resembles that of musk. The vitriolic acid, according to the same author, produces a resin still more bitter, but without any aromatic smell. Cronstedt enumerates the following species.

1. *Maitha*, or Barbadoes tar, a thick substance resembling tort pitch. It is found in several parts of Europe and Asia; particularly Sweden, Germany, and Switzerland; on the coast of the Dead Sea in

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Paletine;

(A) Alonso Barba, in his book of metals, gives a very melancholy instance of the power of petroleum of taking fire at a distance. He tells us, that a certain well, yielding petroleum on the surface of it, being to be repaired, the workmen took down into the well with him a lantern and a candle in it: there were some holes in the lantern, through which the petroleum at a considerable distance sucked out the flame of the candle, and, taking fire, burst up with the noise of a cannon, and tore the man to pieces.

Petroleum Palestine; in Persia, in the chinks of rocks, and in strata of gypsum and limestone, or floating upon water. It is found also in America, and at Coldbrook lake in Holland. Kirwan tells us, that petroleum exposed for a long time to the air forms this substance. It is of a viscid consistence; and of a brown, black, or reddish black colour. Sometimes it is inodorous, but generally of a more or less disagreeable smell, particularly when burned. It melts easily, and burns with much smoke and soot, leaving either ashes or a slag according to the heterogeneous matter it contains. It contains a portion of the acid of amber. It gives a bitter salt with mineral alkali, more difficult of solution than common salt, and which, when treated with charcoal, does not yield any sulphur.

II. *Elastic Petrol*: a very singular kind of fossil met with in some parts of England. This, in colour and consistency, exactly resembles the CAOUTCHOUC, or elastic gum-resin, commonly called *Indian rubber*, found in South America, and used for rubbing out the traces of black lead pencils from paper. It is of a dark brown colour, almost black; and in some pieces has a yellowish brown cast like the same gum-resin. It can scarce be distinguished from the caoutchouc with regard to its elastic property, excepting that the cohesion of its parts is not so great. It burns with a smoky flame, and melts likewise into a thick oily fluid; but emits a disagreeable smell like the *Fossil*

Pitch or *Barbaless tar*. "On the whole (says M. Pet. Macellan), this fossil seems to confirm the opinion of these mineralogists who believe that these oily combustibles derive their origin from the vegetable kingdom. It seems worth trying whether pieces of asphaltum, buried in damp beds of sparry rubbish or other kinds of earth, would take the same elastic consistence." This substance was found in the year 1785 near Cassilton in Derbyshire, but in very small quantities. Some of the specimens were of a cylindrical form, like bits of small branches or stalks of vegetables; tho' much more flexible, being perfectly elastic.

III. *Hardened rock-oil*, or fossil pitch, an inflammable substance dug out of the ground in many parts of the world, and known by the names of *petroleum induratum*, *pix montana*, *indenpech*, *bergbartz*, &c. There are two species. 1. The asphaltum (a), or pure fossil pitch, found on the shores of the Dead Sea and of the Red Sea; also in Sweden, Germany, and France: See ASPHALTUM. It is a smooth, hard, brittle, inodorous substance, of a black or brown colour when looked at; but on holding it up betwixt the eye and the light, appears of a deep red. It swims in water; breaks with a smooth and shining surface; melts easily; and, when pure, burns without leaving any ashes; but, if impure, leaves ashes, or a slag. M. Monet asserts that it contains sulphur, or at least the vitriolic acid. It is slightly and partially acted upon by spirit-of-wine and

(b) This species is found in great quantity in a bituminous lake or plain in the island of Trinidad, of which Mr Anderson gives the following copious account in the 79th volume of the Philosophical Transactions.

"A most remarkable production of nature in the island of Trinidad, is a bituminous lake, or rather plain, known by the name of *Tar Lake*; by the French called *La Bray*, from the resemblance to, and answering the intention of, ship-pitch. It lies in the leeward side of the island, about half-way from the Bocas to the south end, where the mangrove swamps are interrupted by the sand-banks and hills; and on a point of land which extends into the sea about two miles, exactly opposite to the high mountains of Paria, on the north side of the gulf.

"This cape, or headland, is about 50 feet above the level of the sea, and is the greatest elevation of land on this side of the island. From the sea it appears a mass of black vitrified rocks; but, on a close examination, it is found a composition of bituminous scoriæ, vitrified sand, and earth, cemented together: in some parts beds of cinders only are found. In approaching this cape, there is a strong sulphureous smell, sometimes disagreeable. This smell is prevalent in many parts of the ground to the distance of eight or ten miles from it.

This point of land is about two miles broad, and on the east and west sides, from the distance of about half a mile from the sea, falls with a gentle declivity to it, and is joined to the main land on the south by the continuation of the mangrove swamps; so that the bituminous plain is on the highest part of it, and only separated from the sea by a margin of wood which surrounds it, and prevents a distant prospect of it. Its situation is similar to a savannah, and like them, it is not seen till treading upon its verge. Its colour and even surface present at first the aspect of a lake of water; but it is possible it got the appellation of *Lake* when seen in the hot and dry weather, at which time its surface to the depth of an inch is liquid; and then from its cohesive quality it cannot be walked upon.

"It is of a circular form, about three miles in circumference. At my first approach it appeared a plain, as smooth as glass, excepting some small clumps of shrubs and dwarf trees that had taken possession of some spots of it; but when I had proceeded some yards on it, I found it divided into areolæ of different sizes and shapes: the chasms or divisions anastomosed through every part of it; the surface of the areolæ perfectly horizontal and smooth; the margins undulated, each undulation enlarged to the bottom till they join the opposite. On the surface, the margin or first undulation is distant from the opposite from four to six feet, and the same depth before they coalesce; but where the angles of the areolæ oppose, the chasms or ramifications are wider and deeper. When I was at it all these chasms were full of water, the whole forming one true horizontal plane, which rendered my investigation of it difficult and tedious, being necessitated to plunge into the water a great depth in passing from one areolæ to another. The truest idea that can be formed of its surface will be from the areolæ and their ramifications on the back of a turtle. Its more common consistence and appearance is that of pit-coal, the colour rather greyer. It breaks into small fragments of



Fig. 1.



Pennatula. Fig. 4.

Fig. 6.



Fig. 3.



Fig. 5.



Fig. 7.

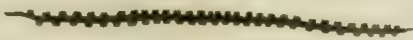


Fig. 8.



Petrified animal body.

Fig. 10.



Fig. 9.



petroleum and ether. Besides the countries above-mentioned, Brunnich informs us that the asphaltum comes from Porto Principe in the island of Cuba in the West Indies. It is likewise found, according to Fourcroy, in many parts of China; and is used for a covering to ships by Arabs and Indians. 2. The *pix montana impura* contains a great quantity of earthly matter, which is left in the retort after distillation, or upon the charcoal it burns in the open fire. It coheres like a slag, and is of the colour of black-lead; but in a strong heat this earth is soon volatilised, so that its nature is not yet well known. During the distillation a liquid substance falls into the receiver, which is found to be

of the same nature with rock-oil. The substance itself is found in Sweden and several other countries. The *pis asphaltum* is of a mean consistence between the asphaltum and the common petroleum. Mongez says that it is the same with the bitumen collected from a well named *De la Peye*, near Clermont Ferrand in France.

The people of mount Ciaro, in Italy, have some years since found out a much easier way of finding petroleum than that which they formerly had been used to. This mountain abounds with a sort of greyish salt, which lies in large horizontal beds, mingled with strata of clay, and large quantities of a spar of that kind called

a cellular appearance, and glossy, with a number of minute and shining particles interspersed through its substance; it is very friable, and, when liquid, is of a jet black colour. Some parts of the surface are covered with a thin and brittle scoria, a little elevated.

"As to its depth, I can form no idea of it; for in no part could I find a substratum of any other substance: in some parts I found calcined earth mixed with it.

"Although I smelt sulphur very strong on passing over many parts of it, I could discover no appearance of it, or any rent or crack through which the steams might issue; probably it was from some parts of the adjacent woods: for although sulphur is the basis of this bituminous matter, yet the smells are very different, and easily distinguished, for its smell comes the nearest to that of pitch of any thing I know. I could make no impression on its surface without an axe: at the depth of a foot I found it a little softer, with an oily appearance, in small cells. A little of it held to a burning candle makes a hissing or crackling noise like nitre, emitting small sparks with a vivid flame, which extinguish the moment the candle is removed. A piece put in the fire will boil up a long time without suffering much diminution: after a long time's severe heat, the surface will burn and form a thin scoria, under which the rest remains liquid. Heat seems not to render it fluid, or occupy a larger space than when cold; from which, I imagine, there is but little alteration on it during the dry months, as the solar rays cannot exert their force above an inch below the surface. I was told by one Frenchman, that in the dry season the whole was an uniform smooth mass; and by another, that the ravine contained water fit for use during the year. But neither can I believe: for if, according to the first assertion, it was an homogeneous mass, something more than an external cause must affect it to give it the present appearance; nor without some hidden cause can the second be granted. Although the bottoms of these ramified channels admit not of absorption, yet from their open exposure, and the black surface of the circumjacent parts, evaporation must go on amazingly quick, and a short time of dry weather must soon empty them; nor from the situation and structure of the place is there a possibility of supply but from the clouds. To show that the progress of evaporation is inconceivably quick here, at the time I visited it there were, on an average, two-thirds of the time incessant torrents of rain; but from the afternoon being dry, with a gentle breeze (as is generally the case during the rainy season in this island), there evidently was an equilibrium between the rain and the evaporation; for in the course of three days I saw it twice, and perceived no alteration on the height of the water, nor any outlet for it but by evaporation.

"I take this bituminous substance to be the *bitumen asphaltum* Linnæi. A gentle heat renders it ductile, hence, mixed with a little grease or common pitch, it is much used for the bottoms of ships, and for which intention it is collected by many; and I should conceive it a preservative against the borer, so destructive to ships in this part of the world.

"Besides this place, where it is found in this solid state, it is found liquid in many parts of the woods; and at the distance of 20 miles from this about two inches thick in round holes of three or four inches diameter, and often at cracks or rents. This is consequently liquid, and smells stronger of tar than when inspissated, and adheres strongly to any thing it touches; grease is the only thing that will divert the hands off it.

"The soil in general, for some distance round La Bray, is cinders and burnt earths; and where not so, it is a strong argillaceous soil; the whole exceedingly fertile, which is always the case where there are any sulphureous particles in it. Every part of the country, to the distance of 30 miles round, has every appearance of being formed by convulsions of nature from subterraneous fires. In several parts of the woods are hot springs; some I tried, with a well graduated thermometer of Fahrenheit, were 20° and 22° hotter than the atmosphere at the time of trial. From its position to them, this part of the island has certainly experienced the effects of the volcanic eruptions, which have heaped up those prodigious masses of mountains that terminate the province of Paria on the north; and no doubt there has been, and still probably is, a communication between them. One of these mountains opposite to La Bray in Trinidad, about 30 miles distant, has every appearance of a volcanic mountain: however, the volcanic efforts have been very weak here, as no traces of them extend above two miles from the sea in this part of the island, and the greater

part,

Petromy-
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called by the *Germans, Meiler*; which is the common sort, that terminates with acids, and readily dissolves in them, and calines in a final fire. They pierce these slates in a perpendicular direction till they find water; and the petroleum which had been dispersed among the cracks of those slates is then washed out by the water, and brought from all the neighbouring places to the hole or well which they have dug, on the surface of the water of which it swims after eight or ten days. When there is enough of it got together, they lade it from the top of the water with brass tasons; and it is then easily separated from what little water is taken up with it. These wells or holes continue to furnish the oil in different quantities for a considerable time; and when they will yield no more, they pierce the slates in some other place.

It is never used among us as a medicine; but the French give it internally in hysterical complaints, and to their children for worms: some also give it from 10 to 15 drops in wine for suppressions of the menses. This, however, is rather the practice of the common people than of the faculty.

PETROMYZON, the LAMPREY, a genus of fishes belonging to the class of *amphibian nantes*. It has seven spiracles at the side of the neck, no gills, a fistula on the top of the head, and no breast or belly fins. There are three species, distinguished by peculiarities in their back fins.

1. The *marinus*, or sea lamprey, is sometimes found so large as to weigh four or five pounds. It greatly resembles the eel in shape; but its body is larger, and its snout longer, narrower, and sharper, at the termination. The opening of the throat is very wide; each jaw is furnished with a single row of very small teeth; in the middle of the palate are situated one or two other teeth, which are longer, stronger, and moveable towards the inside of the throat; the inferior part of the palate presents moreover a row of very small teeth, which reaches to the bottom of the throat, where we find four long notched bones; two short fistulous pro-

cesses are observable at the extremity of the snout, and there are two others thicker but still shorter above the eyes. Willoughby supposes that the latter are the organ of hearing, and the former the organ of smell. His opinion with regard to the auditory faculty of this fish is founded on what we read in ancient authors, that the fishermen attracted the lampreys by wailing; and that Crassus had tamed one of them to fetch a degree that it knew his voice and obeyed his call.

The eyes of the lamprey are small, and covered with a transparent light blue membrane; the pupil is bordered with a circle of a colour resembling gold; near the gills, which are four in number, there is a round hole on both sides, through which it discharges the water. The lamprey has no fins on his belly or breast; on the back we observe a fin, which begins pretty near the head, extends to the tail which it turns round, and is afterwards continued to the anus: this fin is covered by the skin of the body, to which it adheres but loosely; the skin is smooth, of a red blackish colour, and streaked with yellow; the lamprey swims in the water with winding motions like those of a serpent, which is common to it, with all the anguiform fishes.

The lamprey lives on flesh. During the cold it lies concealed in the crevices of sea rocks, and consequently is fished for only at certain seasons. It lives in a state of hostility with the poulpe, a kind of sea polypus, which thwarts the combat as long as it can; but when it finds the impossibility of escape, it endeavours to surround the lamprey with its long arms. The latter slips away, and the poulpe becomes its prey. The lobster, we are told, avenges the poulpe, and destroys the lamprey in its turn. See **CANCER**.

Rondelet says, that the fishermen consider the bite of the lamprey a venomous and dangerous, and never touch it while alive but with pincers. They beat it on the jaws with a stick, and cut off its head. The same naturalist observes, that its ashes are a cure for its bite and for the king's evil. When any one has been

part of it has had its origin from a very different cause to that of volcanoes; but they have certainly laid the foundation of it, as is evident from the high ridge or mountains which surmount its windward side to protect it from the depredations of the ocean, and is its only barrier against that overpowering element, and may properly be called the skeleton of the island.

"From every examination I have made I find the whole island formed of an argillaceous earth, either in its primitive state or under its different metamorphoses. The base of the mountains are composed of *schistus argillaceus* and *calcareum submarginato*; but the plains or lowlands remaining nearly in the same moist state as at its formation, the component particles have not experienced the vicissitudes of nature so much as the more elevated parts, consequently retain more of their primitive forms and properties. As argillaceous earth is formed from the sediment of the ocean, from the situation of Trinidad to the continent its formation is easily accounted for, granting first the formation of the ridge of mountains that bounds its windward side, and the high mountains on the continent that nearly join it: for the great influx of currents into the gulf of Paria from the coasts of Brazil and Andalusia must bring a vast quantity of light earthy particles from the mouth of the numerous large rivers which traverse these parts of the continent: but the currents being repelled by these ridges of mountains, eddies and smooth water will be produced where they meet and oppose; and therefore the earthy particles would first settle, and form banks of mud, and by fresh accumulations added, would soon form dry land: and from these causes it is evident such a tract of country as Trinidad must be formed. But these causes still exist, and the effect from them is evident; for the island is daily growing on the leeward side, as may be seen from the mud-banks that extend a great way into the gulf, and there constantly increase. But from the great influx from the ocean at the southern end of the island, and its egress to the Atlantic again, through the Bocas, a channel must ever exist between the continent and Trinidad." See **TRINIDAD**.

been bit by a lamprey, the most effectual method is to cut out the part affected. Lampreys are very dexterous in saving themselves: when taken with a hook, they cut the line with their teeth; and when they perceive themselves caught in a net, they attempt to pass through the meshes. They fish for lampreys only on the pebbly edges of sea-rocks; some of these pebbles are drawn together to make a pit as far as the water edge, or perhaps a little blood is thrown in, and the lamprey is immediately observed to put forth its head between two rocks. As soon as the hook, which is baited with crab or some other fish, is presented to it, it swallows it greedily, and drags it into its hole. There is then occasion for great dexterity to pull it out suddenly; for if it is allowed time to attach itself by the tail, the jaw would be torn away before the fish could be taken. This shows that its strength resides in the end of its tail; the reason of which is, that the great bone of this fish is reversed, so that the bones, which in all other fishes are bent towards the tail, are here turned in a contrary direction, and ascend towards the head. After the lamprey is taken out of the water, it is not killed without a great deal of trouble: the best way is to cut the end of its tail, or perhaps to crush it with repeated blows on the spine, in order to prevent it from leaping. This shows that in the lamprey animal life extends to the end of the spinal marrow.

M. de Querhoent removes our fears concerning the supposed poison of the lamprey. This species of fish, he tells us, abounds on the coasts of Africa and at the Antilles isles; it is found likewise on the coast of Brazil, at Surinam, and in the East Indies. When taken with a hook, we must have the precaution to kill it before we take it off, otherwise it darts upon the fisher and wounds him severely. Its wounds, however, are not venomous, M. de Querhoent having seen several sailors who were bit by it, but experienced no disagreeable consequences. Lampreys are likewise found in great abundance at Ascension Island, but particularly in the seas of Italy: their flesh when dried is excellent; and boiling gives to the vertebræ the colour of grigelin.

The flesh of the lamprey is white, fat, soft, and tender; it is pretty agreeable to the taste, and almost as nourishing as that of the eel; those of a large size are greatly superior to the small ones. We know that the most wealthy of the Romans kept them in fish ponds at a great expence. Vadius Pollio, the friend of Augustus, who is distinguished in history for his savage gluttony, on supposition that lampreys fed on human flesh were more delicate, ordered his slaves when accused of the slightest faults to be thrown into his fish-ponds. We are no less surpris'd, in reading the ancient authors, to perceive the extraordinary attachment which the celebrated orators Hortensius and Crassus, men in other respects so grave and sensible, had to this animal. One of them shed tears at the loss of a lamprey; the other improved upon this puerility, and wore mourning at the death of his favourite. It is remarkable, that this fish, which is proper to the sea, and never comes into the rivers, can live and fatten in fresh water. For the advancement of natural history, it were to be wished, that some person who lives near the sea shore would make observations, in order to discover whether the

lamprey is viviparous: its scales are so imperceptible, that they have been overlooked by most ichthyologists.

Mr Pennant is of opinion, that the ancients were unacquainted with this fish; at least, he says, it is certain, that which Dr Arbuthnot and other learned men render the word *lamprey*, is a species unknown in our seas, being the *muræna* of Ovid, Pliny, and others, for which we want an English name. This fish, the *lupus* (our bass), and the *myxo* (a species of mullet), formed that pride of Roman banquets the *tripatinum*, so called, according to Arbuthnot, from their being served up in a machine with three bottoms. The words *lampetra* and *petromyzon* are but of modern date, invented from the nature of the fish; the first *a lamb in do petras*, the other from *petros* and *myxo*, because they are supposed to lick or suck the rocks.

2 The fluviatilis, or lesser lamprey, sometimes grows to the length of 10 inches. The mouth is formed like that of the preceding. On the upper part is a large bifurcated tooth: on each side are three rows of very minute ones: on the lower part are seven teeth, the exterior of which on one side is the largest. The insides are yellow. As in all the other species, between the eyes on the top of the head is a small orifice, of great use to clear its mouth of the water that remains on adhering to the stones; for through that orifice it ejects the water in the same manner as cetaceous fish. On the lower part of the back is a narrow fin, beneath that rises another, which at the beginning is high and angular, then grows narrow, surrounds the tail, and ends near the anus. The colour of the back is brown or dusky, and sometimes mixed with blue; the whole underside silvery. These are found in the Thames, Severn, and Dee; are potted with the larger kind; and are by some preferred to it, as being milder tasted. Vast quantities are taken about Mortlake, and sold to the Dutch for bait for their cod-fishery. Above 430,000 have been sold in a season at 40s. per 100; and of late, about 100,000 have been sent to Harwich for the same purpose. It is said that the Dutch have the secret of preserving them till the turbot fishery.

3. The bronchialis, or lampern, is sometimes found of the length of eight inches, and about the thickness of a swan's quill; but they are generally much smaller. The body is marked with numbers of transverse lines, that pass cross the sides from the back to the bottom of the belly, which is divided from the mouth to the anus by a straight line. The back fin is not angular like that of the former, but of an equal breadth. The tail is lanceolated, and short at the end. They are frequent in the rivers near Oxford, particularly the Isis; but not peculiar to that county, being found in others of the English rivers, where, instead of concealing themselves under the stones, they lodge themselves in the mud, and never are observed to adhere to any thing like other lampreys.

PETRONIUS was a renowned Roman senator. When governor of Egypt, he permitted Herod, king of the Jews, to purchase in Alexandria any quantity of corn which he should judge necessary for the supply of his subjects, who were afflicted with a severe famine. When Tiberius died, Caius Caligula, who succeeded him, took from Vitellius the government of Syria, and gave

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Petronius.

Petronius.

it to Petronius, who discharged the duties of his office with dignity and honour. From his inclination to favour the Jews, he run the risk of losing the emperor's friendship and his own life; for when the prince gave orders to have his statue deposited in the temple of Jerusalem, Petronius, finding that the Jews would rather suffer death than see that sacred place profaned, was unwilling to have recourse to violent measures; and therefore preferred a moderation, dictated by humanity, to a cruel obedience. (We must not confound him with another of the same name, viz. Petronius Granius, who was a centurion in the eighth legion, and served under Cæsar in the Gallic war). In his voyage to Africa, of which country he had been appointed quaestor, the ship in which he sailed was taken by Scipio, who caused all the soldiers to be put to the sword, and promised to save the quaestor's life, provided that he would renounce Cæsar's party. To this proposal Petronius replied, that "Cæsar's officers were accustomed to grant life to others, and not to receive it;" and, at the same time, he stabbed himself with his own sword.

Petronius Arbitr (Titus), a great critic and polite writer of antiquity, the favourite of Nero, supposed to be the same mentioned by Tacitus in the 16th book of his Annals. He was proconsul of Bithynia, and afterwards consul, and appeared capable of the greatest employments. He was one of Nero's principal confidants, and in a manner the superintendant of his pleasures; for that prince thought nothing agreeable or delightful but what was approved by Petronius. The great favour shown him drew upon him the envy of Tigellinus, another of Nero's favourites, who accused him of being concerned in a conspiracy against the emperor; on which Petronius was seized, and was sentenced to die. He met death with a striking indifference, and seems to have tasted it nearly as he had done his pleasures. He would sometimes open a vein and sometimes close it, conversing with his friends in the meanwhile, not on the immortality of the soul, which was no part of his creed, but on topics which pleased his fancy, as of love-verses, agreeable and passionate airs; so that it has been said "his dying was hardly ceasing to live." Of this disciple of Epicurus, Tacitus gives the following character: "He was (says he) neither a spendthrift nor a debaucher, like the generality of those who ruin themselves; but a refined voluptuary, who devoted the day to sleep, and the night to the duties of his office, and to pleasure." This courtier is much distinguished by a satire which he wrote, and secretly conveyed to Nero; in which he ingeniously describes, under borrowed names, the character of this prince. Voltaire is of opinion that we have no more of this performance but an extract made by some obscure libertine, without either taste or judgment. Peter Petit discovered at Traw in Dalmatia, in 1665, a considerable fragment, containing the sequel of Trimalcion's Feast. This fragment, which was printed the year after at Padua and at Paris, produced a paper war among the learned. While some affirmed that it was the work of Petronius, and others denied it to be so, Petit continued to assert his right to the discovery of the manuscript, and sent it to Rome, where it was acknowledged to be a production of the 15th century. The French critics, who had attacked its authenticity,

were silent from the moment it was deposited in the royal library. It is now generally attributed to Petronius, and found in every subsequent edition of the works of that refined voluptuary. The public did not form the same favourable opinion of some other fragments, which were extracted from a manuscript found at Belgrade in 1688, and printed at Paris by Nodot in 1694, tho' they are ascribed by the editor Charpentier, and several other learned men, to Petronius; yet, on account of the Gallicism and other barbarous expressions with which they abound, they have generally been considered as unworthy of that author. His genuine works are, 1. A Poem on the civil war between Cæsar and Pompey, translated into prose by Abbé de Marolles, and into French verse by Président Bouchier, 1737, in 4to. Petronius, full of fire and enthusiasm, and disgusted with Lucan's flowery language, opposed Pharsalia to Pharsalia; but his work, though evidently superior to the other in some respects, is by no means in the true style of epic poetry. 2. A Poem on the Education of the Roman Youth. 3. Two Treatises; one upon the Corruption of Eloquence, and the other on the Causes of the Decay of Arts and Sciences. 4. A Poem on the Vanities of Dreams. 5. The Shipwreck of Licas. 6. Reflections on the Inconstancy of Human Life. And, 7. Trimalcion's Banquet. To this last performance morality is not much indebted. It is a description of the pleasures of a corrupted court; and the painter is rather an ingenious courtier than a person whose aim is to reform abuses. The best editions of Petronius are those published at Venice, 1499, in 4to; at Amsterdam, 1669, in 8vo, *cum notis variorum*; Ibid. with Besenius's notes, 1677, in 24to; and 1700, 2 vols in 24to. The edition of *variorum* was reprinted in 1743, in 2 vols 4to, with the learned Peter Burman's commentaries. Petronius died in the year 65 or 66.

PETRONIUS (Maximus) was born in the year 395 of an illustrious family, being at first a senator and consul of Rome. He put on the imperial purple in 455, after having effected the assassination of Valentinian III. In order to establish himself upon the throne, he married Eudoxia the widow of that unfortunate prince; and, as she was ignorant of his villany, he confessed to her, in a transport of love, that the strong desire he had of being her husband, had made him commit this atrocious crime. Whereupon Eudoxia privately applied to Genseric, king of the Vandals, who coming into Italy with a very powerful army, entered Rome, where the usurper then was. The unhappy wretch endeavoured to make his escape; but the soldiers and people, enraged at his cowardice, fell upon him; and overwhelmed him with a shower of stones. His body was dragged through the streets of the city for three days; and, after treating it with every mark of disgrace, they threw it into the Tiber the 12th of June the same year, 455. He reigned only 77 days. He had some good qualities. He loved and cultivated the sciences. He was prudent in his councils, circumspect in his actions, equitable in his judgments; a facetious companion, and steady friend. He had the good fortune to win the affections of every body, while he remained a private character; but as a prince, he was so much the more detestable, in that, after he had obtained the throne by villany, he kept possession of it only by violence.

Phalene.

Plate CCLXXXIX

. 122.



. 123.



. 124.



. 125.



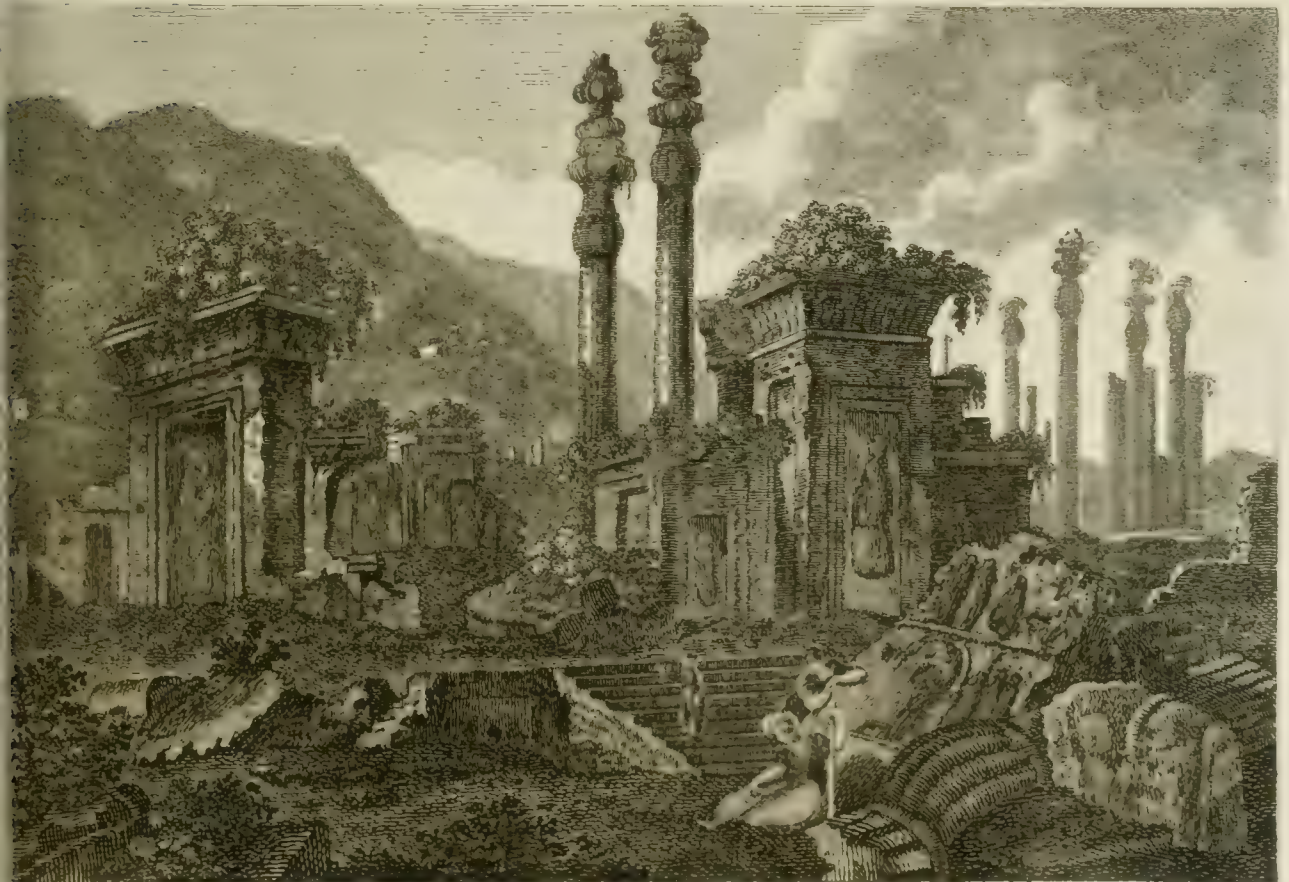
. 126.



Phaeton or Tropic Bird.



Persepolis.



. 127. The Helicospira fossil.

petrosa The crown was scarcely on his head before it appeared to him an insupportable burden. "Happy Democles (exclaimed he in his despair), thou wert a king during a single entertainment!"

PETROSA OSSA, in anatomy, a name given to the fourth and fifth bones of the cranium, called also *offa temporum* and *offa squamosa*; the substance whereof, as their first and last names express, is squamose and very hard.

PETROSELINUM (*APIUM PETROSELINUM*, Lin.) *Parsley*. This plant is commonly cultivated for culinary purposes. The seeds have an aromatic flavour, and are occasionally used as carminatives, &c. The root of parsley is one of the five aperient roots, and with this intention is sometimes made an ingredient in apozems and diet-drinks: if liberally used, it is apt to occasion flatulencies; and thus, by distending the viscera, produces a contrary effect to that intended by it: the taste of this root is somewhat sweetish, with a light degree of warmth and aromatic flavour.

PETTEIA, in the ancient music, a term to which we have no one corresponding in our language.

The *melopœia*, or the art of arranging sounds in succession so as to make melody, is divided into three parts, which the Greeks call *lepsis*, *mixis*, and *chresis*; the Latins *sumptio*, *mixtio*, and *usus*; and the Italians *presa*, *mescolamento*, and *uso*. The last of these is called by the Greeks *petteia*, and by the Italians *pettia*; which therefore means the art of making a just discernment of all the manners of ranging or combining sounds among themselves, so as they may produce their effect, *i. e.* may express the several passions intended to be raised. Thus it shows what sounds are to be used, and what not; how often they are severally to be repeated; with which to begin, and with which to end; whether with a grave sound to rise, or an acute one to fall, &c. The *petteia* constitutes the manners of the music; chooses out this or that passion, this or that motion of the soul, to be awakened; and determines whether it be proper to excite it on this or that occasion. The *petteia*, therefore, is in music much what the manners are in poetry.

It is not easy to discover whence the denomination should have been taken by the Greeks, unless from *pettia*, their game of chess; the musical *petteia* being a sort of combination and arrangement of sounds, as chess is of pieces called *pettia*, *calculi*, or "chess-men."

PETTY (Sir William), son of Anthony Petty a clothier, was born at Rumsey, a little haven-town in Hampshire, in 1623; and while a boy took great delight in spending his time among the artificers there, whose trades he could work at when but twelve years of age. Then he went to the grammar-school there: at 15 he was master of the Latin, Greek, and French tongues, and of arithmetic and those parts of practical geometry and astronomy useful to navigation. Soon after he went to Caen in Normandy, and Paris, where he studied anatomy, and read Vesalius with Mr Hobbes. Upon his return to England, he was preferred in the king's navy. In 1643, when the war

between the king and parliament grew hot, he went into the Netherlands and France for three years; and having vigorously prosecuted his studies, especially in physic, at Utrecht, Leyden, Amsterdam, and Paris, he returned home to Rumsey. In 1647, he obtained a patent to teach the art of double writing for seventeen years. In 1648, he published at London "Advice to Mr Samuel Hartlib, for the advancement of some particular parts of learning." At this time he adhered to the prevailing party of the kingdom; and went to Oxford, where he taught anatomy and chemistry, and was created a doctor of physic. In 1650, he was made professor of anatomy there; and soon after a member of the college of physicians in London. The same year he became physician to the army in Ireland; where he continued till 1659, and acquired a great fortune. After the restoration, he was introduced to king Charles II. who knighted him in 1661. In 1662, he published "A Treatise of taxes and contributions." Next year he was greatly applauded in Ireland for his invention of a double-bottomed ship. He died at London of a gangrene in the foot, occasioned by the swelling of the gout, in 1687.

The character of his genius is sufficiently seen in his writings, which were much more numerous than those we have mentioned above. Amongst these, it is said, he wrote the history of his own life, which unquestionably contained a full account of his political and religious principles, as may be conjectured from what he has left us upon those subjects in his will. In that he has these remarkable words: "As for legacies to the poor, I am at a stand; and for beggars by trade and election, I give them nothing: as for impotents by the hand of God, the public ought to maintain them: as for those who can get no work, the magistrates should cause them to be employed; which may be well done in Ireland, where are fifteen acres of improveable land for every head: as for prisoners for crimes by the king, or for debt by their prosecutors, those who compassionate the sufferings of any object, let them relieve themselves by relieving such sufferers; that is, give them alms (A), &c. I am contented, that I have assisted all my poor relations, and put many into a way of getting their own bread, and have laboured in public works and inventions, and have sought out real objects of charity; and do hereby conjure all who partake of my estate, from time to time to do the same at their peril. Nevertheless, to answer custom, and to take the sure side, I give twenty pounds to the most wanting of the parish wherein I die." As for his religion, he says, "I die in the profession of that faith, and in the practice of such worship, as I find established by the laws of my country; not being able to believe what I myself please, nor to worship God better than by doing as I would be done unto, and observing the laws of my country, and expressing my love and honour to Almighty God, by such signs and tokens as are understood to be such by the people with whom I live." He died possessed of a very large fortune, as appears by his will; where he makes his real estate

Petty.

(A) In the town of Rumsey there is a house which was given by him for the maintenance of a charity-school: the rent of which is still applied to that use.

Petty
II
Peucedanum

about 6500*l.* *per annum*, his personal estate about 45,000*l.* his bad and desperate debts 30,000*l.* and the demonstrable improvements of his Irish estate, 4000*l.* *per annum*; in all, at six *per cent.* interest, 15,000*l.* *per annum*. This estate came to his family, who were afterwards ennobled.

The variety of pursuits in which Sir William Petty was engaged, shows him to have had a genius capable of any thing to which he chose to apply it; and it is very extraordinary, that a man of so active and busy a spirit could find time to write so many things as it appears he did.

PETTY, any thing little or diminutive, when compared with another.

PETTY Bag, an office in chancery; the three clerks of which record the return of all inquisitions out of every county, and make all patents of comptrollers, gaugers, customers, &c.

PETTY-Chaps, in ornithology. See MOTACILLA.

PETTY-Fagger, a little tricking solicitor or attorney, without either skill or conscience.

PETTY, or *Petit*, Larceny. See LARCENY.

PETTY-Patees, among confectioners, a sort of small pies, made of a rich crust filled with sweet meats.

PETTY-Singles, among falconers, are the toes of a hawk.

PETTY Tally, in the sea language, a competent allowance of victuals, according to the number of the ship's company.

PETTY, or *Petit*, Treason. See TREASON.

PETUNSE, in natural history, one of the two substances whereof porcelain or china-ware is made. The petunse is a coarse kind of flint or pebble, the surface of which is not so smooth when broken as that of our common flint. See PORCELAIN.

PETWORTH, in Suffex in England, five miles from Midhurst and the Suffex Downs, and 49 from London, is a large, populous, and handsome town. It is adorned with several seats of gentlemen, particularly the magnificent seat of the Percies, earls of Northumberland, many of whom lie buried in a separate vault of its church. The rectory, the richest in the county, is said to be worth 600*l.* or 700*l.* a year, and is in the Duke of Somerset's gift: in whose armory in this place, there is a sword which, by circumstances, appears to have been the weapon of the famous Henry Hotspur, though it is not so unwieldy as other ancient swords generally are.

PEUCEDANUM, or SULPHUR WORT: A genus of the digynia order, belonging to the pentandria class of plants; and in the natural method ranking under the 45th order *Umbellata*. The fruit is lobated, striated on both sides, and surrounded by a membrane; the involucre are very short. There are three species; none of which have any remarkable properties excepting the officinale, or common hog's fennel, growing naturally in the English salt marshes. This rises to the height of two feet, with channelled stalks, which divide into two or three branches, each crowned with an umbel of yellow flowers, composed of several small circular umbels. The roots, when bruised, have a strong fetid scent like sulphur, and an acrid, bitterish, unctuous taste. Wounded in the spring, they yield a considerable quantity of yellow juice, which dries into a gummy resin, and retains the strong smell of the root.

This should seem to be possessed of some medicinal virtues, but they have never been ascertained with any precision. The expressed juice was used by the ancients in lethargic disorders.

PEUTEMAN (Peter) was born at Rotterdam in 1650, and was a good painter of inanimate objects; but the most memorable particular relative to this artist was that incident which occasioned his death.

He was requested to paint an emblematical picture of mortality, representing human skulls and bones surrounded with rich gems and musical instruments, to express the vanity of this world's pleasures, amusements, or possessions; and that he might imitate nature with the greater exactness, he went into an anatomy room, where several skeletons hung by wires from the ceiling, and bones, skulls, &c. lay scattered about; and immediately prepared to make his designs.

While he was thus employed, either by fatigue, or by intense study, insensibly he fell asleep; but was suddenly roused by a shock of an earthquake, which happened at that instant, on the 18th of September 1692. The moment he awoke, he observed the skeletons move about as they were shaken in different directions, and the loose skulls roll from one side of the room to the other; and being totally ignorant of the cause, he was struck with such a horror, that he threw himself down stairs, and tumbled into the street half dead. His friends took all possible pains to efface the impression made on his mind by that unlucky event, and acquainted him with the real cause of the agitation of the skeletons; yet the transaction still affected his spirits in so violent a manner, that it brought on a disorder, which in a very short time ended his days. His general subjects were either allegorical or emblematical allusions to the shortness and misery of human life.

PEWEE, SEA CROW, or *Mire-crow*, in ornithology. See LARUS.

PEWTER, a facitious metal used in making domestic utensils, as plates, dishes, &c.—The basis of the metal is tin; which is converted into pewter by mixing at the rate of an hundred weight of tin with 15 pounds of lead and six pounds of brass.—Besides this composition, which makes the common pewter, there are other kinds, compounded of tin, regulus of antimony, bismuth, and copper, in several proportions.

PEYRERE (Isaac la) was born at Bourdeaux, of protestant parents. He entered into the service of the Prince of Conde, who was much pleased with the singularity of his genius. From the perusal of St Paul's writings he took into his head to aver, that Adam was not the first of the human race; and, in order to prove this extravagant opinion, he published in 1655 a book, which was printed in Holland in 4to and in 12mo, with this title, *Præadamitæ, five exercitatio super versibus* 12. 13. 14. *cap.* 15. *Epistola Pauli ad Romanos*. This work was burnt at Paris, and the author imprisoned at Brussels, through the influence of the archbishop of Maline's grand vicar. The Prince of Conde having obtained his liberty, he travelled to Rome in 1656, and there gave in to Pope Alexander VII. a solemn renunciation both of Calvinism and Præadamism. His conversion was not thought to be sincere, at least with regard to this last heresy. His desire to be the head of a new sect is evident; and his book discovers his ambition;

ambition; for he there pays many compliments to the Jews, and invites them to attend his lectures. Upon his return to Paris, notwithstanding the earnest solicitations of his holiness to remain at Rome, he went again into the Prince of Conde's service in the quality of librarian. Some time after he retired to the seminary *des Vertus*, where he died the 30th of January 1676, at the age of 82, after the sacraments of the church had been administered to him. Father Simon says, that when he was importuned in his last moments to retract the opinion which he had formed respecting the Preadamites, his answer was, *Hi quacunq; ignorant, blessement*. His having no fixed sentiments of religion is supposed to proceed more from a peculiar turn of mind than a corruption of the heart; for good nature, simplicity of manners, and humanity, seem to have formed his character. "He was, says Nicéron, a man of a very equal temper, and most agreeable conversation. He was a little too fond, however, of indulging his wit, which sometimes bordered on raillery; but he took care never to hurt or wound the feelings of his neighbour. As to his learning, it was extremely limited. He knew nothing either of Greek or Hebrew; and yet he ventured to give a new interpretation of several passages of the sacred volume. He piqued himself on his knowledge of the Latin; but excepting a few poets which he had read, he was by no means an adept in that language. His style is very unequal; sometimes too swelling and pompous, at other times low and grovelling." Besides the work already mentioned, he has left behind him, I. A treatise as singular as it is scarce, intitled, *Du rappel des Juifs*, 1643, in 8vo. The recal of the Israelites, in the opinion of this writer, will be not only of a spiritual nature, but they will be reinstated in the temporal blessings which they enjoyed before their rejection. They will again take possession of the holy land, which will resume its former fertility. God will then raise up to them a king more just, and more victorious, than any of their former sovereigns had been. Now, though all this is doubtless to be understood spiritually of Jesus Christ, yet our author is of opinion, that it ought also to be understood of a temporal prince, who shall arise for the purpose of effecting the temporal deliverance of the Jews; and that this prince shall be no other than the king of France, for the following reasons, which, it is believed, will carry conviction to few minds: 1. Because the two titles of *Most Christian*, and of *Eldesi Son of the Church*, are ascribed to him by way of excellence. 2. Because it is presumable, if the kings of France possess the virtue of curing the evil or scrofula, which can only afflict the bodies of the Jews; that they will likewise have the power of curing their obstinate incredulity and the other inveterate diseases of their souls. 3. Because the kings of France have for their arms a *flour de luce*; and because the beauty of the church is in scripture compared to the beauty of lilies. 4. Because it is probable that France will be the country whither the Jews shall first be invited to come and embrace the Christian faith, and whither they shall retreat from the persecution of the nations that have dominion over them; for France is a land of freedom, it admits of no slavery, and whoever touches it is free. Peyrere, after explaining his strange system, proposes a method of converting

the Jews to Christianity; a method, says Nicéron, which will not be acceptable to many. He proposes to reduce the whole of religion to a bare faith or belief in Jesus Christ; taking it for granted, without any shadow of proof, that "it is as difficult to comprehend the articles of our faith, as to observe the ceremonies of Moses.—From this scheme (says he) there would result a double advantage to the church; the reunion of the Jews, and of all those Christians who are separated from the body of the church." Peyrere, when he wrote this book, was a Calvinist; but his Calvinism too nearly resembled the Deism of our age. He confessed himself that his reason for quitting the Protestants was on account of their being the first and principal opposers of his book concerning the Preadamites. II. A curious and entertaining account of Greenland, printed in 8vo, 1647. When he was asked, on occasion of this work, why there were so many witches in the north? he replied, "It is because part of the property of these pretended conjurers, when condemned to suffer death, is declared to belong to their judges." III. An equally interesting account of Iceland, 1663, 8vo. IV. A letter to Philotimus; 1658, in 8vo, in which he explains the reasons of his recantation, &c. We find in Moreri the following epitaph of him, written by a poet of his own times.

La Peyrere ici git, ce bon Israelite,
Huguenot, Catholique, enfin Preadamite :
Quatre religions lui plurent à la fois,
Et son indifférence étoit si peu comue,
Qu'après quatre-vingts ans qu'il eut à faire un
choix,

Le bon homme partit, & n'en choisit pas une.

PEYRONIUS (Francis de la) for a long time practised surgery at Paris with such distinguish'd eclat, that he obtained for himself the appointment of first surgeon to Louis XV. He improved this favourable situation with his majesty, and procured to his profession those honours which had the effect to quicken its progress, and those establishments which contributed to extend its benefits. The Royal College of Surgery at Paris was founded by his means in 1731, was enlightened by his knowledge, and encouraged by his munificence. At his death, which happened at Versailles the 24th of April 1747, he bequeathed to the society of surgeons in Paris two thirds of his effects, his estate of Marigni, which was sold to the king for 200,000 livres, and his library. This useful citizen also left to the society of surgeons at Montpellier two houses, situated in that town, with 100,000 livres, for the purpose of erecting there a chirurgical amphitheatre. He appointed the same society universal legatees for the third of his effects; and all these legacies contain clauses whose sole object is to promote the public good, the perfection and improvement of surgery; for which he always solicited the protection of the court. At the time of the famous dispute between the physicians and surgeons, he entreated the Chancellor d'Agueilan to build up a brazen wall between the two bodies. "I will do so, replied the minister, but on what side of the wall shall we place the sick?" Peyronius afterwards behaved with more moderation.—He was a philosopher without any ostentation; but his philosophy was tempered by a long acquaintance with the world and with the court. The acuteness and delicacy of

Pezay
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Pezron.

his understanding, joined to his natural vivacity, rendered his conversation agreeable; and all these advantages were crowned with a quality still more valuable, an uncommon degree of sympathy for those in distress. He was no sooner known to be at his estate in the country, than his house was filled with sick people, who came to him from the distance of 7 or 8 leagues round about. He had once a plan of establishing, on this spot, an hospital, to which he intended to retire, that he might devote the remainder of his life to the service of the poor.

PEZAY (N. Maffon, marquis of), born at Paris, very early applied himself to the study of letters, and afterwards went into the army. He was made a captain of dragoons; and had the honour of giving some lessons on tactics to the ill-fated Louis XVI. Being appointed inspector general of some coasting vessels, he repaired to the maritime towns, and executed his commission with more care and attention than was to have been expected from a votary of the muses. But as, at the same time, he showed too much haughtiness, a complaint was brought against him to the court, and he was banished to his country seat, where he died soon after, in the beginning of 1778. He was the intimate friend and companion of Dorat. He had studied, and successfully imitated, his manner of writing; but his poems have more delicacy, and are less disfigured with trifling conversations of gallantry. He has left behind him, 1. A translation of Catullus, which is not much esteemed. 2. *Les Soirées Helvétiques, Alsaciennes, & Franco-Comtoises*, in 8vo, 1770; a work very agreeably diversified, full of charming landscapes, but written with too little accuracy. 3. *Les Soirées Provençales*, in manuscript, which are said to be nowise inferior in merit to the foregoing ones. 4. *La Rosière de Salency*; a pastoral in three acts, and which has been performed with success on the Italian theatres. 5. *Les campagnes de Maillebois*, in 3 vols 4to, and a volume of maps.

PEZENAS, a place in France about 24 miles from Montpellier. The soil about it is sandy. The rock is limestone. The fields are open, and produce corn, wine, and oil. There are to be seen at this place the extensive ruins of a castle, which formerly belonged to the Montmorency family. This strong fortress was hewn out of the rock on which it stands, and appears to have been complicated and full of art. The walls are lofty, and above 8 feet in thickness. The rock, which is perpendicular, is a mass of shells, such as turbinæ, oysters, cockles, with a calcareous cement. From hence the circumjacent plain, decked with luxuriant verdure, and shut in by rugged mountains, affords a most delightful prospect. E. Long. 3. 35. N. Lat. 43. 18.

PEZIZA, cup-mushroom, in botany; a genus of the natural order of fungi, belonging to the cryptogamia class of plants. The fungus campanulated and sessile. Linnæus enumerates 8 species.

PEZRON (Paul), a very learned and ingenious Frenchman, born at Hennebont in Brittany in 1639, and admitted into the order of Cîteaux in 1660. He was a great antiquary, and was indefatigable in tracing the origin of the language of the Goths; the result of which was, that he was led to espouse a system of the world's being much more ancient than modern chronologers have supposed. This he communicated

to the public in a treatise printed at Paris in 1687, 4to, intitled, *The antiquity of Time, restored and defended against the Jews and modern chronologers*. This book of Pezron's was extremely admired for the ingenuity and learning in it; yet caused no small alarm among the religious, against whom he nevertheless defended his opinions. He went through several promotions, the last of which was to the abbey of Charmoye, to which he was nominated by the king; and died in 1706.

PHACA, in botany: A genus of the decandria order, belonging to the diadelphia class of plants; and in the natural method ranking under the 32d order, *Papilionaceæ*. The legumen is semibilocular.

PHÆA, a famous sow which infested the neighbourhood of Cromyon. Theseus destroyed it as he was travelling from Trœzene to Athens to make himself known to his father. Some imagine that the boar of Calydon sprang from this sow. According to some authors, Phæa was a woman who prostituted herself to strangers, whom she murdered, and afterwards plundered.

PHÆACIA, one of the names of the island Corcyra, (Homer, Stephanus). *Phæaces* the people, (Ovid), noted for their indolence and luxury: hence Horace uses *Phæax* for a person indolent and sleek; and hence arose their indolence and pride, (Aristotle). The island was famous for producing large quantities of the finest flavoured apples, (Ovid, Juvenal, Propertius).

PHÆDON, a disciple of Socrates, who had been seized by pirates in his youth; and the philosopher, who seemed to discover something uncommon and promising in his countenance, bought his liberty for a sum of money, and ever after esteemed him. Phædon, after Socrates's death, returned to Elis his native country, where he founded a sect of philosophers who composed what was called the *Eliac school*. The name of Phædon is affixed to one of Plato's dialogues.

PHÆDRA (fab. hist.) was a daughter of Minos and Pasiphaë; she married Theseus, by whom she was the mother of Acamas and Demophoon. They had already lived for some time in conjugal felicity, when Venus, who hated all the descendants of Apollo, because he had discovered her amours with Mars, inspired Phædra with the strongest passion for Hippolytus the son of Theseus, by the amazon Hippolyte. This passion she long attempted to stifle, but in vain; and therefore, in the absence of Theseus, she addressed Hippolytus with all the impatience of desponding love. He rejected her with horror and disdain. She, however, incensed by the reception she had met, resolved to punish his coldness and refusal; and at the return of Theseus she accused Hippolytus of attempts upon her virtue. He listened to her accusation; and without hearing Hippolytus's defence, he banished him from his kingdom, and implored Neptune, who had promised to grant three of his requests, to punish him in an exemplary manner. As Hippolytus fled from Athens, his horses were suddenly terrified by a sea monster, which Neptune had sent on the shore; and he was thus dragged through precipices and over rocks, trampled under the feet of his horses, and crushed under the wheels of his chariot. When his tragical end was known at Athens, Phædra confessed her crime, and hung herself

Phædrus self in despair, unable to survive one whose death her extreme guilt had occasioned. The death of Hippolytus, and the infamous passion of Phædra, is the subject of one of the tragedies of Euripides and of Seneca. She was buried at Træzene, where her tomb was still to be seen in the age of the geographer Pausanias, near the temple of Venus, which she had built to render the goddess favourable to her incestuous passion. Near her tomb was a myrtle, whose leaves were full of small holes, which, it was reported, Phædra had done with a hair pin, when the vehemence of her passion had rendered her melancholy and almost desperate. She was represented in a painting in Apollo's temple at Delphi, as suspended in the air, while her sister Ariadne stood near to her, and fixed her eyes upon her.

PHÆDRUS, an ancient Latin writer, who composed five books of fables, in Iambic verse. He was a Thracian; and was born, as there is reason to conclude, some years before Julius Cæsar made himself master of the Roman empire. How he came into the service of Augustus is not known: but his being called *Augustus's freedman* in the title of the book, shows that he had been that emperor's slave. The fables of Phædrus are valued for their wit and good sense, expressed in very pure and elegant language; and it is remarkable that they remained buried in libraries altogether unknown to the public, until they were discovered and published by Peter Pithou, or Pithæus, a learned French gentleman, toward the close of the 16th century.

PHÆDRUS (Thomas) was a professor of eloquence at Rome, early in the 16th century. He was canon of Lateran, and keeper of the library in the Vatican. He owed his rise to the acting of Seneca's Hippolytus, in which he performed the part of Phædra; from whence he ever after got the name of Phædrus. Erasmus, who tells this, says he had it from cardinal Raphael Georgianus, in whose court-yard, before the palace, that tragedy was acted. The cause of his death was very remarkable; for as he was riding through the city on a mule, he met a cart drawn by wild oxen, and was thrown by his mule, who took fright at them. Though corpulent, the cart fortunately passed over him without doing him any hurt, as he fell in the space between the wheels; but fright and the fall together spoiled the whole mass of his blood so much, that he contracted a distemper, of which, after languishing some time, he died under the age of 50. If he had lived, he would most probably have become an author; and perhaps, adds Bayle, have confirmed what has been observed of him, that his tongue was better than his pen. The observation was made by Erasmus, who tells us, that he knew and loved him; and owns that he was called the Cicero of his time. Janus Parrhasius, his colleague, was much grieved at his death, and gave the titles of several works, which were almost ready for public view.

PHÆNOMENON, in philosophy, denotes any remarkable appearance, whether in the heavens or earth, and whether discovered by observation or experiment.

PHAETON, in fabulous history, was the son of the Sun, or Phœbus and Clymene, one of the Oceanides. He was son of Cephalus and Aurora, according to Hesiod and Pausanias; or of Tithonus and Aurora, according to Apollodorus. He is, however, more generally acknowledged to be the son of Phœbus and Clymene. He was naturally of a lively disposition, and a handsome figure. Venus became enamoured of him, and entrusted him with the care of one of her temples. This distinguishing favour of the goddess rendered him vain and aspiring; and when Epaphus, the son of Io, had told him, to check his pride, that he was not the son of Phœbus, Phaeton resolved to know his true origin, and at the instigation of his mother he visited the palace of the sun. He begged Phœbus, that if he really were his father he would give him incontestable proofs of his paternal tenderness, and convince the world of his legitimacy. Phœbus received him with great tenderness, and swore by Styx to grant whatever he requested as a proof of his acknowledging him for his son. The youth boldly asked the direction of the chariot of the sun for one day. His father, grieved and surprised at this demand, used all his arguments to dissuade him from the rash attempt; but all was in vain: and being by his oath reduced to submit to his obstinacy, entrusted him with the reins, after he had directed him how to use them. The young adventurer was however soon sensible of his madness. He was unable to guide the fiery steeds; and loosing the reins, Jupiter, to prevent his consuming the heavens and earth, struck him with a thunderbolt, and hurled him from his seat into the river Eridanus or Po. His sisters Phaethusa, Lambetia, and Phœbe, lamenting his loss upon its banks, were changed by the gods into black poplar trees; and Cycnus king of Liguria, also grieving at his fate, was transformed into a swan.

The poets say, that while Phaeton was driving the chariot of his father, the blood of the Ethiopians was dried up; and their skin became black; a colour which is still preserved among the greatest part of the inhabitants of the torrid zone. The territories of Libya were also, they tell us, parched up, on account of their too great vicinity to the sun; and ever since, Africa, unable to recover her original verdure and fruitfulness, has exhibited a sandy country and uncultivated waste. According to those who explain this poetical fable, Phaeton was a Ligurian-prince, who studied astronomy, and in whose age the neighbourhood of the Po was visited with uncommon heats.

PHAETON, in ornithology, a genus of birds belonging to the order of anseres; the characters of which are: The bill is sharp, straight, and pointed; the nostrils are oblong, and the hinder toe is turned forward. There are two species, viz.

1. The demersus, or red-footed penguin, has a thick, arched, red bill; the head, hind-part of the neck, and the back, of a dusky purplish hue, and breast and belly white; brown wings, with the tips of the feathers white; instead of a tail, a few black bristles; and red legs. It is found on Penguin Isle, near the Cape of Good Hope, is common all over the South Seas, and is about the size of a goose.

2. The ethereus, or tropic bird, is about the size of a partridge, and has very long wings. The bill is red, with an angle under the lower mandible. The eyes are encompassed with black, which ends in a point towards

Phæton.

Phæton.

wards the back of the head. Three or four of the larger quill feathers, towards their ends, are black, tipped with white; all the rest of the bird is white, except the back, which is variegated with curved lines of black. The legs and feet are of a vermillion red. The toes are webbed. The tail consists of two long straight narrow feathers, almost of equal breadth from their quills to their points. See Plate CCCLXXXIX.

"The name *tropic bird* (says Latham), given to this genus, arises from its being chiefly found within the tropic circles; but we are not to conclude, that they never stray voluntarily, or are driven beyond them; for we have met with a few instances to prove the contrary (A). It is, however, so generally found within the tropical limits, that the sight of this bird alone is sufficient to inform the mariner of a very near approach to if not his entrance therein. It has also been thought to portend the contiguity of land (B); but this has often proved fallacious, as it is not unfrequently found at very great distances therefrom. The flight of this bird is often to a prodigious height; but at other times it is seen, along with the frigate pelican, booby, and other birds, attending the flying fishes at their rise from the water, driven from their native element into the air by their watery enemies, the shark (C), porpoise, albicore, bonito, and dolphin, which pursue them beneath, and prey upon them. These birds are sometimes observed to rest on the surface of the water, and have been now and then seen in calm weather upon the backs of the drowsy tortoises, supinely floating in the sea, so that they have been easily taken by the long boat manned. On shore they will perch on trees; and are said to breed in the woods, on the ground beneath them. They have been met with in plenty on the islands of St Helena, Ascension, Mauritius, New Holland, and various places in the South Seas; but in no place so numerous as at Palmerston Island, where these birds, as well as the frigates, were in such plenty, that the trees were absolutely loaded with them, and so tame, that they suffered themselves to be taken off the boughs with the hand. At Otaheite, and in the Friendly isles, the natives give them the names of *haingoo* and *toolaiee*.

"As the tropic bird sheds the long tail feathers every year, the inhabitants of such isles as they frequent, collect and make use of them by way of ornament in various manners; they are worn in the caps of the Sandwich islanders, being in great plenty at Taboora, as also in various parts of their dress; but in none more conspicuous than in the mourning garment of Ota-

heite, in which island numbers are picked up in the mountainous parts, where it also breeds. The flesh cannot be called good, but was found sufficiently acceptable to those who had long been confined to salt provisions, and in which circumstance the sailors did not despise it."

There is a variety of this bird called by Latham the *rubite tropic bird*. It is less than the one we have already described, and is found in as many places as it. The plumage of this bird is in general of a silvery white. The yellow tropic bird is a further variety of the same species, the plumage being of a yellowish white. These differences, Mr Latham thinks, arise merely from age, if they are not the distinguishing mark of sex.

3. The black-billed tropic bird is smaller than any of the former. The bill is black; the plumage on the upper part of the body and wings is striated, partly black and partly white; before the eye there is a large crescent of black, behind it is a streak of the same; the forehead and all the under parts of the body are of a pure white colour; the quills and tail are marked as the upper parts, but the ends of the first are white, and most of the feathers of the last are marked with dusky black at the tips; the sides over the thighs are striated with black and white; the legs are black. One of these was found at Turtle and Palmerston islands, in the South Seas, and is in the possession of Sir Joseph Banks.

4. The red-tailed tropic bird is in length about two feet ten inches, of which the two tail feathers alone measure one foot nine inches. The bill is red; the plumage white, tinged of an elegant pale rose-colour; the crescent over the eyes is somewhat abrupt in the middle; the ends of the scapulars are marked with black. This bird is distinguished from others by two middle long tail feathers, which are of a beautiful deep red colour, except the shafts and base, which are black; the sides over the thighs are dusky; and the legs are black.

"This species (says Latham) is met with frequently at large as the others, but does not seem to be so far spread. Our navigators met with them in various places, though they were seldom seen by them on shore except in the breeding season, which is in September and October. They are found in great numbers in the island of Mauritius, where they make the nest in hollows in the ground under the trees; the eggs are two in number, of a yellowish white marked with rufous spots.

(A) "Dr Forster observes, that they are never seen beyond 28 degrees of latitude; but others talk of their spreading far beyond it. In lat. 32. 45. *Ell. Narr.* ii. p. 64.—33. 10. N. *Cook's last Voy.* iii. p. 178.—38. 34. S. *Park. Voy.* p. 132.—38. 29. S. *Hawkes. Voy.* iii. p. 77. This is mentioned as not being common; but Kalm says he met with these in 40 degrees north. See *Trav.* i. p. 22.—And a friend of mine assured me, that he saw one in latitude 47½ north; but at the same time observed, that it was the first instance he had ever known of such a circumstance.

(B) "*Wilson's Voy.* ii. p. 301. He observes, that they seldom are met with above eight or ten leagues from land.

(C) "*Squalus conductor, delphinus phocaena, scomber thynnus, scomber pelamis, delphinus coryphæna.* See *Phil. Trans.* vol. lxviii. p. 500. It is there observed, that the flying fish is able to fly 60 or more yards at one stretch, and repeat it a second or even a third time, only the slightest momentary touch of the surface that can be conceived intervening; and it is common in these flights for them to fly against ships, or fall on the deck.

Phæton.

spots. The same author gives an account of the introduction of paradise grackles into the island of Bourbon, from whence they spread into that of Mauritius; at first intended for the very useful purpose of destroying the locusts and grasshoppers, which swarmed there to a great degree: the result of their prodigious increase, and the unlooked for consequence of it, he has likewise mentioned. These birds, we are told, are great enemies to the tropic birds, ocular demonstration of which was had by M. de Querhoent; for, being seated beneath a tree in which were perched a number of the grackles, he observed a tropic bird come to its hole, in order to go to the nest; but the grackles attacked the bird all at once, and obliged it to fly off; it then returned with its consort in company, but without effect, as they were both driven away, as the single one had been before; when the grackles returned to their tree, and the spectator left them in that situation.

"This species of tropic bird has been met with in several places of the South Seas; very common at Palmarston and Turtle islands; at Hervey's island in the greatest plenty, and of which considerable numbers were killed for provisions; and here also they make the nests in the same manner as at Mauritius. The name it is known by at Otaheite and the Friendly isles is *tanigge* and *totto*." See DIOMEDEA and PINGUI.

PHAGEDÆNA, in medicine, denotes a corroding ulcer.

PHAGEDENIC MEDICINES, those used to eat off proud or fungous flesh; such as are all the caustics.

PHAGEDENIC Water, in chemistry, denotes a water made from quicklime and sublimate; and is very efficacious in the cure of phagedenic ulcers. To prepare this water, put two pounds of fresh quicklime in a large earthen pan, and pour upon it about ten pounds of rain-water; let them stand together for two days, stirring them frequently: at last leave the lime to settle well, then pour off the water by inclination, filtrate it, and put it up in a glass bottle, adding to it an ounce of corrosive sublimate in powder; which from white becomes yellow, and sinks to the bottom of the vessel. The water being settled, is fit for use in the cleansing of wounds and ulcers, and to eat off superfluous flesh, and especially in gangrenes; in which case may be added to it a third or fourth part of spirit of wine.

PHALÆNA, the MOTH, in zoology, a genus of insects belonging to the order of lepidoptera. The feelers are cetaceous, and taper gradually towards the points; the wings are often bent backwards.

Barbut divides this genus into eight families, and we are told that there are no less than 460 species. The names of the several families are given by Barbut as follows: 1. The attaci, whose wings incline downwards and are spread open: they have pectinated antennæ without a tongue, or pectinated antennæ with a spiral tongue, or cetaceous antennæ with a spiral tongue. 2. The bombyces, whose wings cover the body in a position nearly horizontal, and which have pectinated antennæ. They are either clingues, which want the tongue, or have it so short as not to be manifestly spiral; their wings are either reversed or deflected: or spirilingues, which have a spiral tongue; and are

either læves with smooth backs, or cristatæ dorso with a kind of crest or tuft of hair on the back. 3. The noctuæ, whose wings are incumbent as in the bombyces, from which they differ chiefly in the formation of the antennæ, which are cetaceous. The noctuæ are either clingues, wanting tongues, or spirilingues having spiral tongues. 4. The geometræ, whose wings when at rest are extended horizontally: the antennæ in one subdivision of this section are pectinated, in another cetaceous; the under wings in each of these divisions are either angulated, or round with entire edges. 5. The tortrices. The wings are exceeding obtuse, their exterior margin is curve, and declines towards the sides of the body. They have short palpi. 6. The pyralides. The inner margins of the wings in this section are laid one over the other; the wings themselves decline a little towards the sides of the body, and in shape resemble a delta; they have considerable palpi of different forms. 7. The tineæ. The wings are wrapped up or folded round the body, so as to give the insect a cylindrical form; the forehead is stretched out or advanced forwards. 8. The alucitæ. The wings of this division are split, or divided into branches almost to their base.

The caterpillars of this genus vary much as to size, and considerably as to their shape and number of feet. It is remarkable, that caterpillars of almost every species of this genus are found with 10, 12, 14, and 16 feet. The last are the most common and the largest; those of 10 and 12 feet are called *geometræ*. "Amongst the *geometræ* caterpillars (says Barbut) there are some very singular, whether for their colour, or the tubercula which they bear, or lastly for the difference of their attitudes. Many resemble small branches or bits of dry wood; and that resemblance may be a means of saving many of those insects from the voraciousness of birds, who do not so easily discern them. Other caterpillars are very hairy, while several are quite smooth; the latter have a cleaner look, whereas the hairy ones have something hideous, and may even be hurtful when touched.

"All the caterpillars of *phalænæ*, after having several times cast their slough, spin their cod, in which they are transformed to chrysalids. But the texture of the cod, the fineness of the thread of which it is composed, and the different matters joined to the threads, are infinitely various.

"The chrysalids of *phalænæ* are generally oblong ovals, not angulous as those of butterflies, nor so soon transformed to perfect insects. They remain a much longer time within the cod, the greatest part not coming forth till the ensuing year. Some I have met with that remained in that state during two or three years successively. Heat or cold contribute greatly to forward or put back their final metamorphosis; a fact which may be ascertained by procuring them a certain degree of moderate heat, by which means one may see *phalænæ* brought forth upon one's mantle-piece in the depth of winter.

"The *phalænæ* or perfect insects sprung from those cods, are generally more clumsy and heavy than butterflies; their colours are likewise more brown, dim, and obscure, though there are some *phalænæ* whose colours are very lively and brilliant. Several of them

Phalæna.

Phalæna. fly only in the evening, keeping quiet and close under leaves in the day-time; and this has induced some authors to give them the name of *night butterflies*. In summer evenings they find their way into rooms, attracted by the lights round which they are seen to hover. And indeed a sure method of catching a great number of *phalæna* is to hunt them by night in a bower with a lantern. They all resort to the light of the lantern, about which great numbers of them may be caught.

"A remarkable circumstance has been observed of these *phalæna*, which is, that the females of some of them are without wings. By their looks they never would be taken for *phalæna*. They have the appearance of a large, short, six-legged, creeping animal, while their male is winged and active. Yet this heavy creature is a real *phalæna*, easily distinguished by its antennæ. It even has wings, but so short that they are no more than small protuberances placed at the extremity of the thorax, and that appear quite useless. Those *phalæna* whose females are destitute of wings are generally in the number of those whose antennæ are pectinated. The unwinged females have antennæ similar to those of the males, but with shorter beads only. Their body is also charged with scales, the characteristic of insects of this order."

To describe every species of this extensive genus would be impossible; we shall therefore only take notice of a very few, of which we have given engravings.

The *phalæna attacus pavonia minor*. See N° 1. Plate CCCLXXXIX. The wings of this insect, says Barbut, are brown, undulated, and variegated, having some grey in the middle, and a margin one line broad; in its colour yellowish grey. The under part has more of the grey cast, but the extremities of the wings before the margin have a broad band of brown. The four wings, as well above as beneath, have each a large eye, which eyes are black encompassed with a dun-coloured circle, and above that with a semicircle of white, then another of red, and lastly the eye is terminated by a whole circle of black. Across the middle of the eye is drawn transversely a small whitish line. The caterpillar is green, has 16 feet with rose-colour tubercula, charged with long hairs terminated by a small knob; besides which, it has dun-colour or reddish rings. It is found upon fruit-trees.

Phalæna alucita pentadactyla, N° 2. The eyes of this species are black; the body is of a pale yellow. The wings are snow white, and the insect keeps them stretched asunder when at rest. The superior are divided in two, or rather appear composed of two stumps of bird's feathers united at the base. The inferior ones are likewise divided into three threads or bristles, which are furnished on both sides with fine fringes. The caterpillar is of a green colour, dotted with black, and charged with a few hairs. It feeds upon grass, changes to a chrysalis in or about September, and appears a moth in August, frequenting woods.

Phalæna noctua elinguis humuli, N° 3. In this species the wings of the male are of a snowy white; of the female yellowish, with streaks of a deeper hue; the shoulders, abdomen, &c. in both sexes, are deep yellow. The antennæ are pectinated and shorter than

the thorax. The caterpillar feeds upon the roots of *Phalæna* burdock, hops, &c. changes into a chrysalis in May, appears in the winged state in June, frequenting low marshy grounds where hops grow.

Phalæna noctua pronuba spirilinguis, N° 4. The thorax, head, antennæ, feet, and upper wings, are of a brown colour, more or less dark, sometimes so deep as to be nearly black, but often of a bluish cast. The upper wings are moreover somewhat clouded, and have two black spots, one on the middle, the other towards the outward angle of the lower part of the wing. The under ones are of a beautiful orange colour, with a broad black band near the lower edge of the wing, of which it follows the direction. The caterpillar is smooth; to be found on several plants, but particularly upon the *thlaspi* and some other cruciferous plants. It keeps in concealment during the day, and only feeds by night. Its metamorphosis is performed underground, and some varieties of colour are observable amongst these caterpillars; some being green, others brown; which latter yield males, the former females.

Phalæna tortrix prasinana. The superior wings of this species are of a fine green colour, having two diagonal yellow bars on each, the body and inferior wings are whitish, shaded with yellowish green. The caterpillar is a pale yellowish green, ornamented with small brown specks or spots, the tail being forked and tipped with orange red colour; feeds on the oak, changes to a chrysalis in September, and assumes the fly-state about May, frequenting woods.

PHALANGIUM, in zoology, a genus of insects belonging to the order of aptera. They have eight feet, two eyes on the top of the head placed very near each other, and other two on the sides of the head: the feelers resemble legs, and the belly is round. There are nine species.

Mr Barbut only describes one species, viz. the *phalangium opilis* of Linnæus. His description is as follows: "Its body is roundish, of a dusky brown on the back, with a duskier spot of a rhomboidal figure near the middle of it. The belly is whitish; the legs are extremely long and slender. On the back part of the head there stands a little eminence, which has on it a kind of double crest, formed as it were of a number of minute spines; the eyes are small and black, and are two in number. It is commonly called the *shepherd spider*."

"This species of spider multiplies singularly. They are great spinners. In autumn the stubble is quite covered with the threads of these spiders, by means of which they travel with ease, and ensnare their prey. However, those threads are thought rather to be the produce of a species of tick called *autumnal-weaver*. A small degree of attention discovers an amazing multitude of those ticks almost imperceptible, and that is their work. The threads, when united, appear of a beautiful white, wave about in the air, and are known in the country by the name of *virgin's threads*. Some naturalists think, that those threads, floating in the air, serve the insect as sails to waft it through the air, and as a net to entrap insects on the wing; for remnants of prey, say they, are discoverable in them. As to those parcels in which nothing is seen, they are only essays rejected by those travelling insects. The analogy between the phalangium and the crab, and the facility with

Phalangis with which it parts with its legs to save the rest of the body, has raised a presumption that its legs might grow again, as do those of crabs and lobsters. Country people have an opportunity to endeavour at ascertaining the truth of these observations."

PHALANGOSIS, in surgery, is a tumor and relaxation of the eye-lids, often so great as to deform the eye, and considerably to impede vision. Sometimes the eye-lid when in this state subsides or sinks down, occasioned perhaps either by a palsy of the muscle which sustains and elevates the eye-lid, or else from a relaxation of the cutis above, from various causes. Sometimes an oedematous or aqueous tumor is formed on the eye-lids, so as almost entirely to exclude vision; but this last case should be distinguished from the other, and may be easily remedied by the use of internal and topical medicines, such as purges and diuretics given inwardly, and a compress dipped in warm spirit of wine and lime-water. But in the paralytic or relaxed case, the use of cordial and nervous medicines must be proposed internally; and outwardly, balsam of Peru and Hungary water are to be employed. If all these fail, the remaining method of cure is to extirpate a sufficient quantity of the relaxed cutis; and then, after healing up the wound, the remainder will be sufficiently shortened.

PHALANX, in Grecian antiquity, a square battalion of soldiers, with their shields joined and pikes crossing each other; so that it was next to impossible to break it.

The Macedonian phalanx is supposed by some to have had the advantage, in valour and strength, over the Roman legion. Its number was 8000 men. But the word *phalanx* is used for a party of 28, and several other numbers; and even sometimes for the whole body of foot. See **LEGION**.

PHALANX is applied, by anatomists, to the three rows of small bones which form the fingers. In natural history it is a term which Dr Woodward and some other writers of fossils have used to express an arrangement of the columns of that sort of fossil coralloide body found frequently in Wales, and called *Phalaris lithostrotion*. In the great variety of specimens we find of this, some have the whole phalanx of columns cracked through, and others only a few of the external ones; but these cracks never remain empty, but are found filled up with a white spar, as the smaller cracks of stone usually are. This is not wonderful, as there is much spar in the composition of this fossil; and it is easily washed out of the general mass to fill up these cracks, and is then always found pure, and therefore of its natural colour, white.

The lithostrotion, or general congeries of these phalanges of columns, is commonly found immersed in a grey stone, and found on the tops of the rocky cliffs about Milford in Wales. It is usually erect, though somewhat inclining in some specimens, but never lies horizontal. It seems to have been all white at first, but to have been since gradually tinged with the matter of the stone in which it lies. The single columns, which form each phalanx, are usually round or cylindric, though sometimes flatted and bent; some of them are also naturally of an angular figure; these, however, are not regular in the number of their angles, some consisting of three sides, some of five, and some

of seven; some are hexangular also, but these are scarce. They are from five or six to sixteen inches in length; and the largest are near half an inch over, the least about a quarter of an inch; the greater number are very equal to one another in size; but the sides of the columns being unequal, the same column measures of a different thickness when measured different ways; the phalanges or congeries of these are sometimes of a foot or more in diameter.

The columns are often burst, as if they had been affected by external injuries; and it is evident that they were not formed before several other of the extraneous fossils; for there are found sometimes shells of sea-fishes and entrochi immersed and bedded in the bodies of the columns. It appears plainly from hence, that when these bodies were washed out of the sea, and tossed about in the waters which then covered the tops of these cliffs, this elegant fossil, together with the stony bed in which it is contained, were so soft, that these other bodies found entrance into their very substance, and they were formed as it were upon them. This fossil takes an elegant polish, and makes in that state a very beautiful appearance, being of the hardness of the common white marble, and carrying the elegant structure visible in the smallest lineaments.

PHALARIS, a remarkable tyrant, born at Crete, where his ambitious designs occasioned his banishment: he took refuge in Agrigentum, a free city of Sicily, and there obtained the supreme power by stratagem. The circumstance which has chiefly contributed to preserve his name in history is his cruelty; in one act of which he gave, however, an example of strict justice. It is thus related: Perillus, a brass-founder at Athens, knowing the cruel disposition of Phalaris, contrived a new species of punishment for him to inflict on his subjects. He cast a brazen bull, bigger than the life, with an opening in the side to admit the victims; who being shut up in the body, a fire was kindled under it to roast them to death; and the throat was so contrived, that their dying groans resembled the roaring of a bull. The artist brought it to the tyrant, expecting a great reward. Phalaris admired the invention and workmanship, but ordered the inventor to be put into it to make the first trial. In allusion to which, Ovid says,

—Neque enim lex æquior ulla,
Quam necis artifices arte perire sua.

The end of this detestable tyrant is differently related; but it is very generally believed, with Cicero, that he fell by the hands of the Agrigentines; and, as some suppose, at the instigation of Pythagoras. Ovid tells us, that his tongue was cut out; and that he was then put into the bull to perish by the same slow fire by which means he had murdered so many before. Others say that he was stoned to death; and all agree that his end was violent. He reigned, Eusebius says, 28 years; others say 16. After all, there is great uncertainty both as to his life, death, and history. Many of the circumstances related of him, as they are collected by Mr Boyle, depend upon the authenticity of those epistles which go under the name of the tyrant; and which have been justly questioned, and with great probability rejected, as the spurious production of some modern sophist. See **BENTLEY**, p. 177. col. 2.

Phalaris
||
Phallus.

PHALARIS, or *Canary-grass*, in botany; a genus of the trigynia order, belonging to the triandria class of plants. The calyx is bivalved, carinated, and equal in length, containing the corolla. There are ten species, of which the most remarkable are the canariensis, or manured Canary-grass; and the arundinacea, or reed Canary-grass. These are both natives of Britain. The first grows by the road sides; and is frequently cultivated for the sake of the seeds, which are found to be the best food for the Canary and other small birds. The second grows on the banks of rivers. It is used for thatching ricks or cottages, and endures much longer than straw. In Scandinavia they mow it twice a-year, and their cattle eat it. There is a variety of this cultivated in our gardens with beautifully striped leaves. The stripes are generally green and white; but sometimes they have a purplish cast. This is commonly called *painted lady-grass*, or *ladies tresses*.

PHALEREÆ, among the ancient Romans, were military rewards bestowed for some signal act of bravery. Authors do not agree whether the Phaleræ were a suit of rich trappings for a horse, or golden chains something like the torques, but so formed as to hang down to the breast and display a greater profusion of ornament. The last opinion appears to have the greater prevalence, but perhaps both are true.

PHALEREUS (Nepos), a village and port of Athens; this last neither large nor commotionous, for which reason Themistocles put the Athenians on building the Phæus; both joined to Athens by long walls. The Phaleræus lay nearer the city (Pausanias). Demetrius Phaleræus, the celebrated scholar of Theophrastus, was of this place; to whom the Athenians erected above 300 statues; which were afterwards destroyed by his enemies, on his flight to Ptolemy king of Egypt (Strabo). Here Demosthenes was wont to declaim, to accustom his voice to surmount the noise and roaring of the sea; a just and lively emblem of popular assemblies.

PHALEUCIAN VERSE, in ancient poetry, a kind of verse consisting of five feet; the first of which is a spondee, the second a dactyl, and the three last trochees.

PHALLUS, the *MOREL*, in botany; a genus of the order of fungi, belonging to the cryptogamia class of plants. The fungus is reticulated above and smooth below. There are two species.

1. The *esulentus*, or *esulent morel*, is a native of Britain, growing in woods, groves, meadows, pastures, &c. The substance, when recent, is wax like and friable; the colour a whitish yellow, turning brownish in decay; the height of the whole fungus, about four or five inches. The stalk is thick and clumsy, somewhat tuberous at the base, and hollow in the middle. The pileus is either round or conical; at a medium about the size of an egg, often much larger; hollow within; its base united to the stalk; and its surface cellular, or latticed with irregular sinuses. The magnified seeds are oval. It is much esteemed at table both recent and dried, being commonly used as an ingredient to heighten the flavour of ragouts. We are informed by Gleditsch, that morels are observed to grow in the woods of Germany in the greatest plenty in those places where charcoal has been made. Hence the good women who collect them to sell, receiving a

hint how to encourage their growth, have been accustomed to make fires in certain places of the woods, with heath, broom, vaccinium, and other materials, in order to obtain a more plentiful crop. This strange method of cultivating morels being however sometimes attended with dreadful consequences, large woods having been set on fire and destroyed by it, the magistrate thought fit to interpose his authority, and the practice is now interdicted.

2. The *impudicus*, *stinking morel*, or *stinkhorn*, is also a native of Britain, and found in woods and on banks. It arises from the earth under a veil or volva, shaped exactly like a hen's egg, and of the same colour, having a long fibrous radicle at its base. This egg-like volva is composed of two coats or membranes, the space between which is full of a thick, viscid, transparent matter, which, when dry, glues the coats together, and shines like varnish. In the next stage of growth, the volva suddenly bursts into several lacerated permanent segments, from the centre of which arises an erect, white, cellular, hollow stalk, about five or six inches high and one thick, of a wax-like friable substance, and most fetid cadaverous smell, conical at each end, the base inserted in a white, concave, membranaceous turbinate cup, and the summit capped with a hollow, conical pileus, an inch long, having a reticulated cellular surface, its base detached from the stalk, and its summit umbilicated, the umbilicus sometimes perforated and sometimes closed. The under side of this pileus is covered with a clear, viscid, gelatinous matter, similar to that found between the membranes of the volva; and under this viscid matter, concealed in reticulated receptacles, are found the seeds, which when magnified appear spherical. As soon as the volva bursts, the plant begins to diffuse its intolerable odours, which are so powerful and widely expanded, that the fungus may be readily discovered by the scent only, before it appears to the sight. At this time, the viscid matter between the coats of the volva grows turbid and fuscous; and when the plant attains its full maturity, the clear viscid substance in the pileus becomes gradually discoloured, putrid, and extremely fetid, and soon afterwards turns blackish, and, together with the seeds and internal part of the pileus itself, melts away. The fetid smell then begins to remit, the fungus fades, and continues for a short time sapless and coriaceous, and at last becomes the food of worms. The cadaverous scent of this fungus greatly allures the flies; which, lighting upon the pileus, are entrapped in the viscid matter, and perish. We are informed by Gleditsch, that the vulgar people in Thuringia call the unopened volva by the ridiculous name of *ghosts* and *demon's eggs*; and that they collect and dry them either in the smoke or open air, and when reduced to powder, use them in a glass of spirits as an aphrodisiac.

PHALLUS, among the Egyptians, was the emblem of fecundity. It was very fervently worshipped by women, especially by those who were barren. This custom was introduced among the Greeks, and festivals in honour of it were called *phalica*. See MYSTERIES, n° 38, &c. Among the Hindoos a similar emblem called *lingam* is used, and for similar purposes. See HINDOOS, n° 4.

PHALTI, or **PHALTIEL**, son of Laish. He married

ried Michal, after Saul had taken her from David; but David afterwards took her away from Phalti (1 Sam. xxv. 44. 2 Sam. iii. 15.) Some interpreters are of opinion Phalti did not meddle with Michal all the time she continued in his house, for fear that both of them should incur the penalty of death, to be inflicted on adulterers (Levit. xx. 10.), because Michal had not been legally divorced; but these reasons are frivolous. Saul looked upon David as a rebel to his king, and an outlaw, whose goods and wives belonged to him, and which he could absolutely dispose of. He would not have given Michal to Phalti, nor would he have received her, if he had not thought he might use her as his wife. If Michal had no children by Phalti, by whom then were those children that the scripture says she had, since it is known she had none by David? See 2 Sam. xxi. 8. and vi. 23.

PHANATIC, or FANATIC, a visionary; one who fancies he sees spectres, spirits, apparitions, or other imaginary objects, even when awake; and takes them to be real. See PHANTASY and FANATIC.

Such are phrenetics, necromancers, hypochondriac persons, lycanthropi, &c. See PHRENETIC, HYPOCHONDRIAC, LYCANTHROPI.

Hence the word is also applied to enthusiasts, pretenders to revelation, new lights, prophecies, &c. See ENTHUSIAST, and SECOND Sight.

PHANTASIA was the daughter of Nicarchus of Memphis in Egypt. It has been supposed that she wrote a poem on the Trojan war, and another on the return of Ulysses to Ithaca, from which compositions Homer copied the greatest part of his Iliad and Odyssey, when he visited Memphis, where they were deposited.

PHANTASM, a term sometimes used in a synonymous sense with idea, or notion retained in the mind, of an external object.

PHANTASY, or FANCY, the *Imagination*; the second of the powers or faculties of soul, by which the species of objects received by the external organs of sense are retained, recalled, further examined, and either compounded or divided. See IMAGINATION; and METAPHYSICS, Part I. Chap. ii.

Others define the phantasy to be that internal sense or power, whereby the ideas of absent things are formed, and represented to the mind as if they were present. In melancholics and madmen this faculty is very strong, representing many extravagant and monstrous things, and framing its images as lively as those of sensation: whence the visions and deceptions those persons are liable to.

PHANUEL, of the tribe of Asher, the father of a holy widow and prophets called Anna, who was in the temple when our Saviour was presented there by his parents (Luke ii. 36, 37, 38.)

PHAON, a young man of Mytilene, in the island of Lesbos, received from Venus, as fable reports, an alabaster vase filled with an essence which had the virtue of conferring beauty. He had no sooner anointed his body with it than he became the most beautiful of men. The ladies of Mytilene fell desperately in love with him; and the celebrated Sappho threw herself down a precipice because he would not encourage her passion. He is said to have been killed by a husband who surprised him with his wife. We have in Ovid a

letter from Sappho to Phaon, which Mr Pope has translated into English verse.

PHARA (anc. geog.), a village between Egypt and Arabia Petrea; or, according to Ptolemy, at a promontory situated between the Sinus Heroopolites and Elaniticus of the Red Sea; where Israel is said to have dwelt. In Hebrew it is *Paran*, and in most interpreters; *Pharan*, Septuagint and Vulgate. *Pharanite*, the people (Ptolemy.) *Paran* or *Pharan*, the name of the wilderness in its neighbourhood, adjoining to Kadesh.

PHARÆ (anc. geog.), a town of Achaia in Peloponnesus, on the river Pierus, 70 stadia from the sea, and to the south of Patræ 150 stadia. Another, at Crete (Pliny); a colony from the *Phara* of Messenia (Stephanus.) A third *Phara*, or *Phera* (Strabo, Ptolemy); *Phara*, æ, (Polybius); a town of Messenia, on the river Nedo (Strabo); on the north side of the Sinus Messenius, and to the north-west of Abœa. Anciently read *Pharis* in Homer (Pausanias, Statius), though now read *Phare*. *Pharis* is the name of the people.

PHARAMOND is the name which is given by the generality of historians to the first king of France. He is said to have reigned at Treves, and over a part of France, about the year 420; and to have been succeeded by his son Clodion; but the account which is given of these two princes is very uncertain. It is probable Pharamond was properly no more than a general of an army, the head of a military society of Franks, who were masters of their persons and their fortunes. Gregory of Tours seems to have been of this opinion. "It is not generally known (says he) who was the first king of the French. Sulpitius Severus, who mentions several things respecting that nation, takes no notice of its first monarch; he only says that it had generals." Be that as it may, the institution of the famous Salique law (so named from the Salians, the most illustrious of the Franks) is generally attributed to Pharamond. "This law fixed the punishment of crimes, and various points of police. There is no just ground for believing that it expressly settled the right of succession to the crown: it only says, that, with relation to the Salic land, women have no share of heritage, without restricting it to the royal family in particular; for all those were generally called *Salic lands* which were held by right of conquest; and it is easy to conceive that a nation of soldiers, whose general was their king, would not submit to be governed by a woman. A long custom, supported by the principles of the nation, came in time to be the established law of the kingdom." (See *M. Abbé Millot, Elem. de l'Histoire de France*, tom. i.)

PHARAOH, a common name of the kings of Egypt. Josephus says, that all the kings of Egypt, from Minæus the founder of Memphis, who lived several ages before Abraham, have always had the name of Pharaoh, down to the times of Solomon, for more than 3300 years. He adds, that in the Egyptian language the word *Pharaoh* signifies a *king*; and that those princes did not assume this name but when they ascended the throne, at which time they quitted also their former name. From hence it comes to pass,

Pharaoh

says Josephus, that Herodotus names none of the kings of Egypt after Minæus the builder of Memphis, though he had 330 kings for his successors, because they had all the name of Pharaoh; but because this name did not pass to women also, he names an Egyptian queen Nicaule who succeeded them. Lastly, I find, adds Josephus, from the ancient records of our nation, that from the age of Solomon no king of Egypt had any longer the name of Pharaoh.

But Josephus is not very accurate in this passage. True it is, Herodotus says, that Mines, or Minæus, was the first king of Egypt, and founder of Memphis; that there were 330 kings after him in Egypt; that after them there was a queen called Nicotris, and not Nicaule, as Josephus writes it; but it is not true that these kings had no other name but Pharaoh. Herodotus says expressly, that in the books of the Egyptian priests were read the names and the catalogue of 330 kings; that in this number of 330 there were 18 Ethiopians, and a woman that was a foreigner called Nicotris, and that all the others were Egyptians. These princes therefore had every one his proper name mentioned in the catalogue of the Egyptian kings. So likewise we see in the fragments of Manetho, that every king of Egypt had a name peculiar to him; and we find the name Pharaoh only in Scripture.

What Josephus adds concerning queen Nicaule, or Nicotris, whom he pretends to be the same as the queen of Sheba, of whom mention is made in Scripture (1 Kings x. 1, 2, &c.), is entirely fabulous; and as to what he says, that since the time of Solomon the kings of Egypt have no longer had the name of Pharaoh, is manifestly false, since we still find this name in the second book of Kings, under Hezekiah (2 Kings xvii. 21.); under Josiah (xxiii. 29, 30, 33, &c.), where this name is joined to Necho, which was the proper name of this prince; under Jehoikim (xxiii. 35.); and in the prophets Isaiah, Jeremiah, and Ezekiel, who are much later than Solomon. It is very probable that the Egyptians gave the name of Pharaoh to their kings as long as the Egyptian language was in common use, and as long as their kings were of their own nation: but after the conquest of Egypt by Alexander the Great, and that the Grecians introduced their language with their government, the name of Pharaoh was known no longer among them. The first prince known to us by the name of Pharaoh was he in whose time Abraham went down to Egypt, when Sarah, who passed only for Abraham's sister, was by the command of Pharaoh brought to his palace in order to become his wife. See ABRAHAM. But the Lord smote Pharaoh and his family with great infirmities, and gave him to know that she was Abraham's wife; whereupon Pharaoh sent for Abraham, restored him his wife, and at the same time gave orders that he should be conducted out of Egypt, with every thing that belonged to him. See SARAH.

The second Pharaoh spoke of by the Scripture is he that reigned when Joseph arrived there. This prince or his successor had the mysterious dream of the fat and lean kine, and the seven full and barren ears of corn, which Joseph explained so well to his satisfaction, that he made him governor of his house and of all Egypt, reserving only to himself the name of a king. This is the same Pharaoh that sent for and

entertained the patriarch Jacob and his family in Egypt, and gave them the land of Goshen for their habitation. See JOSEPH and JACOB.

The third Pharaoh known in holy writ is he that persecuted the Israelites. Moses tells us that he was a new king, and had no knowledge of Joseph (Exod. i. 8.) This prince, observing that the Israelites were become very numerous and powerful, resolved to oppress them by hardship and labour; and set cruel and pitiless taskmasters over them. But the more he oppressed them, the faster they multiplied; inasmuch that he gave orders to the Egyptian midwives, who assisted the Hebrew women in their labour, to put all the male children to death, and to save alive the females only. But this command was not strictly executed. The midwives feared the Lord, and preserved alive not only the female children, but the males also.

Pharaoh, seeing this project did not succeed to his wishes, published a decree (Exod. i. 22.) that all the male children born of Hebrew women should be thrown into the Nile, and that only the females should be spared. This order was rigorously executed; yet by the providence of God Moses was preserved, and even brought up in Pharaoh's own court, by his own daughter, who by chance had found the child, as he was exposed upon the Nile.

Moses being grown up, and having killed an Egyptian who had abused an Hebrew, was obliged to fly from Egypt to avoid that death that Pharaoh had threatened him with.

Several years after, being about 80 years old, he returned again by an order from God, and performed mighty miracles before Pharaoh. See MOSES. There is a good deal of probability that this Pharaoh before whom Moses appeared, and in whose sight he smote Egypt with so many plagues, was a different person from him who would have laid hands on him after he had slain the Egyptian. This same Pharaoh having at last been compelled to send away the Hebrews, and to suffer them to go out of Egypt, soon repented of the leave he had given, and pursued them at the head of his army with his chariots. But he was crowned in the Red Sea, wherein he had rashly entered in the eagerness of his pursuit. Some historians pretend to give us the name of this Pharaoh; some, as Appion, call him Amosis or Amasis; Eusebius calls him Chenchis; Usher calls him Amenophis; but we may assure ourselves that there can be nothing certain in all this.

The fifth Pharaoh known to us is he that gave protection to Hadad son of the king of Edom, who gave him to wife the sister of his own queen, enriched him with lands, and brought up his son Genubah in his own court. Hadad returned to Idumea after the death of David.

The sixth Pharaoh is he that gave his daughter in marriage to Solomon king of the Hebrews (1 Kings iii. 1.); and having taken Gezer, he set it on fire, drove the Canaanites out of it, and gave it for a present to Solomon, in lieu of a dowry for his daughter, whom he had married to this prince (1 Kings ix. 16.)

The seventh is Shishak, who entertained Jeroboam in his dominions, a rebellious subject of Solomon, and offered him a refuge in opposition to the king his master. The same Shishak declared war against Rehoboam the son and successor of Solomon, besieged and took

Pharaoh

on. took Jerusalem; carried away all the king's treasures, and those of the house of God, and particularly the golden bucklers that Solomon had made. See SHISHAK.

The eighth is that Pharaoh with whom Hezekiah made a league against Sennacherib king of Assyria, in the year of the world 3290. See SENNACHERIB. This Pharaoh is probably the same whom Herodotus names Sethon, priest of Vulcan, who came to meet Sennacherib before Pelusium, and to whose assistance Vulcan sent an army of rats, which gnawed the bow-strings and the thongs of the bucklers of Sennacherib's soldiers.

The ninth is Pharaoh-Necho, or Nechos, son of Psammiticus, who made war with Josiah, and subdued him. Herodotus also mentions this prince. See NECHO, and EGYPT, n° 11.

The tenth is Pharaoh Hophrah, who entered into an alliance with Zedekiah king of Judah, and attempted to come to his assistance against Nebuchadnezzar king of Chaldaea. It was against this Pharaoh that Ezekiel pronounced several of his prophecies (See Ezek. xxix. xxx. xxxi. xxxii.) He is called Apries in Herodotus, l. ii. c. 161. He is also mentioned in Habakkuk ii. 15, 16. See also Isaiah xix. xx. and Jeremiah xlvii. 16, &c. See APRIES, and EGYPT, n° 13, &c.

PHARAON is the name of a game of chance, the principal rules of which are: the banker holds a pack consisting of 52 cards; he draws all the cards one after the other, and lays them down alternately at his right and left hand; then the ponte may at his pleasure set one or more stakes upon one or more cards, either before the banker has begun to draw the cards, or after he has drawn any number of couples. The banker wins the stake of the ponte when the card of the ponte comes out in an odd place on his right hand, but loses as much to the ponte when it comes out in an even place on his left hand. The banker wins half the ponte's stake when it happens to be twice in one couple. When the card of the ponte being but once in the stock happens to be the last, the ponte neither wins nor loses; and the card of the ponte being but twice in the stock, and the last couple containing his card twice, he then loses his whole stake. De Moivre has shown how to find the gain of the banker in any circumstance of cards remaining in the stock, and of the number of times that the ponte's cards is contained in it. Of this problem he enumerates four cases, viz. when the ponte's card is once, twice, three, or four times in the stock. In the first case, the gain of the banker is $\frac{1}{n}$, n being the number of cards in the stock.

In the second case, his gain is $\frac{n-2 \times y}{n \times n-1} + \frac{2}{n \times n-1}$, Pharez, Pharisees.
or $\frac{\frac{1}{2}n+1}{n \times n-1}$, supposing $y = \frac{1}{2}$. In the third case, his

gain is $\frac{3y}{2 \times n-1}$, or $\frac{3}{n \times n-1}$, supposing $y = \frac{1}{2}$. In

the fourth case, the gain of the banker, or the loss of

the ponte, is $\frac{2n-5}{n-1 \times n-3} y$, or $\frac{2n-5}{2 \times n-1 \times n-3}$,

supposing $y = \frac{1}{2}$. De Moivre has calculated a table, exhibiting this gain or loss for any particular circumstance of the play; and he observes, that at this play the least disadvantage of the ponte, under the same circumstances of cards remaining in the stock, is when the card of the ponte is but twice in it, the next greater when three times, the next when once, and the greatest when four times. He has also demonstrated, that the whole gain *per cent.* of the banker, upon all the money that is adventured at this game, is 21. 19s. 10d. See De Moivre's Doctrine of Chances, p. 77, &c. p. 105, &c.

PHAREZ, son of Judah and Tamar (Gen. xxxviii. 27, 28, &c.) Tamar being just ready to lie in, found herself with child of twins. One of them appeared first, and putting his arm out, he immediately drew it back again. The midwife tied a scarlet thread upon his arm, to distinguish him for the first-born: but having withdrawn his hand, his brother got before him into the world: whereupon he was called by his mother Pharez, i. e. *one breaking forth*; as the other with the thread on his hand was called Zarah. The sons of Pharez were Hezron and Hamul (Numb. xxvi. 20, 21.) F. Calmet, upon this article, explains the text as if Pharez, and not Zarah, had put out his hand, and drew it in again.

PHARISEES, a famous sect of the Jews, who distinguished themselves by their zeal for the traditions of the elders, which they derived from the same fountain with the written word itself; pretending that both were delivered to Moses from Mount Sinai, and were therefore both of equal authority. From their rigorous observance of these traditions, they looked upon themselves as more holy than other men: and therefore separated themselves from those whom they thought sinners or profane, so as not to eat or drink with them; and hence, from the Hebrew word *pharis*, which signifies "to separate," they had the name of *Pharisees* or *Separatists*.

This sect was one of the most ancient and most considerable among the Jews; but its original is not very well known (A): however, it was in great repute in the

(A) The Jesuit Serrarius places their first rise about the time of Esdras; because it was then that the Jews first began to have interpreters of their traditions. Maldonat, on the other hand, will not have this sect to have arisen among the Jews till a little before the time of Christ. Others, perhaps with more probability, refer the origin of the Pharisees to the time of the Maccabees.

Dr Lightfoot thinks, that Pharisaism rose up gradually, from a period which he does not assign, to the maturity of a sect. It is certain, from the account given by Josephus, that in the time of John Hyrcanus, the high priest and prince of the Asmonean line, about 108 years before Christ, the sect was not only formed, but made a considerable figure; and that it had advanced to a high degree of popularity and power about 80 years before Christ. Jos. Ant. lib. xiii. cap. 10. § 5, 6. cap. 15. § 5. & cap. 16. § 1. According to Bannage, Hist. of the Jews, book ii. cap. 9. § 2. one Aristobulus, an Alexandrian Jew, and a Peripatetic philosopher, who

Pharisees, the time of our Saviour; and must have had its original at the same time with the traditions, and they grew up together, till at length they had gained ground so far, that the traditional law swallowed up the written, and these who were propagators of it the whole bulk of the Jewish nation.

The extraordinary pretences of the Pharisees to righteousness drew after them the common people, who held them in the highest esteem and veneration. Our Saviour frequently, however, charges them with hypocrisy, and making the law of God of no effect through their traditions (Matt. ix. 2. xv. 1—6. xxiii. 13—33, and Luke xi. 39—52.) Several of these traditions are particularly mentioned in the gospel; but they had a vast number more, which may be seen in the Talmud, the whole subject whereof is to dictate and explain those traditions which this sect imposed to be believed and observed.

The Pharisees, contrary to the opinion of the Sadducees, held a resurrection from the dead, and the existence of angels and spirits (Acts xxiii. 8.) But, according to Josephus, this resurrection of theirs was no more than a Pythagorean resurrection, that is, of the soul only, by its transmigration into another body, and being born anew with it. From this resurrection they excluded all that were notoriously wicked, being of opinion that the souls of such persons were transmitted into a state of everlasting woe. As to lesser crimes, they held they were punished in the bodies which the souls of those who committed them were next sent into.

Josephus, however, either mistook the faith of his countrymen, or, which is more probable, wilfully misrepresented it, to render their opinions more respected by the Roman philosophers, whom he appears to have on every occasion been desirous to please. The Pharisees had many pagan notions respecting the soul; but Bishop Bull, in his *Harmonia Apostolica*, has clearly proved, that they held a resurrection of the body, and that they supposed a certain bone to remain uncorrupted, to furnish the matter of which the resurrection body was to be formed. They did not, however, believe that all mankind were to be raised from the dead. A resurrection was the privilege of the children of Abraham alone, who were all to rise on Mount Zion; their incorruptible bones, wherever they might be buried, being carried to that mountain below the surface of the earth. The state of future felicity, in which the Pharisees believed, was very gross: They imagined, that men in the next world, as well as in the present, were to eat and drink, and enjoy the pleasures of love, each being reunited to his former wife. Hence the Sadducees, who believed in no resurrection, and supposed our Saviour to teach it as a Pharisee, very shrewdly urged the difficulty of disposing of the woman who had in this world been the wife of seven husbands. Had the resurrection of Christianity been the Pharisaical resurrection, this difficulty would have been in-

surmountable; and accordingly we find the people, and even some of the Pharisees themselves, struck with the manner in which our Saviour removed it.

This sect seems to have had some confused notions, probably derived from the Chaldeans and Persians, respecting the pre-existence of souls; and hence it was that Christ's disciples asked him concerning the blind man (John ix. 2.), "Who did sin, this man or his parents, that he was born blind?" And when the disciples told Christ, that some said he was Elias, Jeremias, or one of the prophets (Mat. xvi. 14.), the meaning can only be, that they thought he was come into the world with the soul of Elias, Jeremias, or some other of the old prophets, transmigrated into him. With the Essenes, they held absolute predestination; and with the Sadducees free-will: but how they reconciled these seemingly incompatible doctrines is nowhere sufficiently explained. The sect of the Pharisees was not extinguished by the ruin of the Jewish commonwealth. The greatest part of the modern Jews are still of this sect; being as much devoted to traditions or the oral law as their ancestors were. See the articles CABBALISTS, CARAITES, ESENES, SADDUCEES, &c.

PHARMACA, among the ancients, meant medicated or enchanted compositions of herbs, minerals, &c. some of which, when taken inwardly, were supposed to cause blindness, madness, love, &c. others infected by touch; such was the garment sent by Medea to Creusa, prepared *secundum artem*; and others operated upon persons at a distance. *Pharmaca fœteria* were employed as antidotes against these mischievous compositions: Thus the herb moly preserved Ulysses from the magical influence of Circe. The laurel, the rhamnus, the flea-bane, the jasper-stone, were used for similar purposes. See *Potter's Grec. Ant.*

PHARMACI, were two persons who were employed in the lustration or purification of cities. Some say they were both men; but others maintain, that a man to represent the males, and a woman to represent the females, performed this office. They performed sacrifice, and wore figs about their necks called *pharmaci*; those of the man were blackish, and those of the woman white. Figs were an emblem of fertility, which they doubtless prayed for on these solemn occasions.

PHARMACOCHEMIA, means that part of the chemical art which treats of the preparation of medicines. It is so named by way of distinction from that chemistry which is wholly employed about the transmutation of metals by means of the philosopher's stone; this being called *spagirico-chemia*.

PHARMACOLOGY, is a treatise of medicines, or the art of preparing them, judging of them, &c.

PHARMACOPŒIA (from *pharmakon* remedy, and *poieo* to make), means a dispensatory, or a treatise describing the preparations of the several kinds of medicines, with their uses, manner of application, &c.

We have various pharmacopœias, as those of Baudezon, Quercetan, Zwelfer, Charas, Batcs, Salmon, Lemery,

who flourished about 125 years before Christ, and wrote some allegorical commentaries on the scripture, was the author of those traditions by an adherence to which the Pharisees were principally distinguished from other sects.

Lemery, Lewis, &c. The latest and most in esteem are the Edinburgh and London dispensatories See **PHARMACY**.

PHARMACOPOLA, or **PHARMACOPŒIUS**, an *apothecary*; or a person who prepares and sells medi-

cines. (See **APOTHECARY**). The word is seldom used but by way of ridicule. It is formed from *pharmakon* and *poiein*, to sell. See Horace, Satire 2. lib. i. ver. 1.

PHARMACUM, *Pharmacum*, a medicament or medicine; whether of a salutary or poisonous quality.

Pharma-

cum.

P H A R M A C Y.

PHARMACY(A), is the art of preparing, preserving, and compounding, substances, for the purposes of medicine. This art has been commonly divided into two branches, *Galenic* and *Chemical* pharmacy. But for this division there is no foundation in nature: and accordingly processes in one pharmacopœia referred to the head of Chemical, are in another referred to the head of Galenic. There can be no doubt, that even the most simple pharmaceutical preparations are to a certain extent chemical. Hence this division, founded on prejudice, and supported merely by a veneration for antiquity, is now banished from almost every modern pharmacopœia.

Pharmacy has also been divided into *Theoretical* and *Practical*; the first, consisting not merely of speculative opinions, but of a knowledge of facts and principles, tending to explain the *rationale* of processes; the latter, comprehending the mere manual labour employed in processes.

The former of these may therefore be justly styled

Scientific Pharmacy. And there can be no doubt that an acquaintance with it is essentially necessary to the physician as well as the apothecary: for without it he must often err in the forms of preparations and compositions which he employs; and must be often deceived in the effects resulting from compositions, when he infers their properties from the known powers of the ingredients in their separate state.

The theory of pharmacy therefore is the same with that of chemistry; as are also the operations, which remain to be discussed here only in as far as they are made subservient to the medicinal art, distinct from that which is purely chemical. The objects of pharmacy, however, are much more limited than those of chemistry; the latter comprehending, in the utmost latitude of the word, almost every substance in nature; while pharmacy regards only such bodies in the vegetable, animal, and mineral kingdoms, as, by their effects on the human frame, tend to preserve health, or to restore it when lost.

² Objects of pharmacy.

PART I. ELEMENTS OF PHARMACY.

CHAP. I. A general View of the Properties and Relations of Medicinal Substances.

SECT. I. VEGETABLES.

VEGETABLES are organized bodies, furnished with a variety of vessels for reception, transmission, and perspiration of different fluids. Analogous to animals, they are produced from seeds and eggs, and are endowed with functions, by which the aliment they imbibe is changed into new forms, into solids and fluids, peculiar to particular plants, and to different parts of the same plant.

The analogy between the vegetable and animal kingdoms will appear still more striking, when we consider that the former exhibit, though in a less degree, all the phenomena of sensibility and motion.

The *pabulum* of vegetables, like that of most animals, is of a mixed nature; and is composed of the necessary union of water, heat, and light, and less necessarily of air and earth: the office of these two last

elements seems to be that of filters, or vehicles for conveying the other principles in proper form.

From varieties in the state and proportion of these several agents, a very multiplied diversity takes place in the external form, quantity, and quality, of one and the same vegetable: hence the difference of plants from the soil, climate, season, and other similar circumstances. The influence of heat and light, or what is probably the same thing, the absorption of the inflammable principle, is perhaps the most important article in the aliment of vegetables. This principle, whether derived from the solar rays, from putrid matters employed in manure, or from the putrefaction of the wild growth, assisted by calcareous earths and other septics, is found at all times to modify, in a peculiar manner, the form, the quantity, and even the sensible and inherent properties, of vegetables. It is of importance however to remark, that the soundness and specific principles of vegetables are not invariably the more complete in proportion to the vigour of their growth; high health, which is always a dangerous state in the constitution of animals, is often the means

⁵ Influence of soil, climate, heat, and light, on vegetables.

(A) For this article we are indebted to the liberality of Mr Creech bookseller in Edinburgh, who, with his well known zeal for the cultivation of science, and, regardless of the advantage to be expected from his copy-right, has permitted us to insert into this work the third and much improved edition of the Edinburgh New Dispensatory.

Element. means of perverting or destroying the economy of vegetable life. Thus the finer aromatics, which naturally inhabit the dry and sandy soils, when transplanted into a moist and rich one, or, in other words, when placed in mould abounding with the *ferments* of inflammable principle, grow with rapidity and vigour, and have their bulk considerably increased; but lose very much of their fragrance, as if their active principles were exhausted by the luxuriance of their growth.

6
Plants differ in the different periods of their growth.

Plants are also found to differ considerably in the different periods of their growth. Thus, some herbs in their infancy abound most with odoriferous matter; others again yield little or none till they have attained to a more advanced age. Many fruits, in their immature state, contain an austere acid juice, which by maturation is changed into a sweet one: others, as the brange, are first warm and aromatic, and afterwards by degrees become filled with a strong acid. The common grain, and sundry other seeds, when beginning to vegetate, are in taste remarkably sweet: yet the kernels of certain fruits prove, at the same period, extremely acid. The roots of some of our indigenous plants, whose juice is, during the summer, thin and watery, if wounded early in the spring, yield rich balsamic juices, which, exposed to a gentle warmth, soon concreate into solid gummy-resins, superior to many of those brought from abroad. In open exposures, dry soils, and fair warm seasons, aromatic plants become stronger and more fragrant, while those of an opposite nature become weaker. To these particulars, therefore, due regard ought to be had in collecting plants for medicinal uses.

7
Different parts of the same plant of different qualities from each other.

It may be proper to observe also, that the different parts of one plant are often very different in quality from each other. Thus the bitter herb wormwood rises from an aromatic root; and the narcotic poppy-head includes seeds which have no narcotic power. These differences, though very obvious in the common culinary plants, do not seem to have been sufficiently observed or attended to, in those plants that have been admitted as articles of the *materia medica*.

8
Vegetables obnoxious to disease and death.

Without any obvious dependence on the circumstances above-mentioned, vegetables are, like animals, also obnoxious to diseases and death; which, whether occasioned by intense cold, by insects, lightning, or other causes, always maintain a striking analogy to the affections of animals. The principal difference between animals and vegetables is, that the several parts of vegetables do not constitute such a mutually depending system as those of the more perfect animals: Hence it is, that a very considerable part of a plant may be diseased or dead, while the rest enjoys perfect good life and health. Though the physiology of vegetables is hitherto insufficient for forming any complete doctrines of the causes and cure of their several diseases; yet, in many cases, it might be useful to attend to the formation of a pathology of the vegetable kingdom: in the state even of our present knowledge, it is of importance in the study of pharmacy to be aware that such diseases really exist, and are capable of changing or destroying the active principles of many of our most valuable herbs. In the plants more evidently sensitive, the diseases exhibit a very

close analogy to many of those of animals: several of the remote causes are such as are known to obstruct perspiration, to induce general debility, or otherwise disorder the animal economy. The diseases also are evidently marked by a diminution of their sensitive and moving principle; and perhaps, in consequence of this diminution, their solids, their sap, and other fluids, shrivel and decay, and the whole plant assumes new forms, and is impregnated with inert, or fraught with noxious principles. Analogous also to animals, the plant, when deprived of the living principle, runs into all those changes common to what is called *inanimate matter*. We shall now proceed to examine the changes to which vegetables are subject.

I. Productions from Vegetables by FERMENTATION.

Fermentation is a spontaneous motion excited in dead vegetables and animals, which is peculiar to those organic substances in consequence of the principle of vegetable or animal life. See FERMENTATION.

The circumstances favouring fermentation are in general, a certain degree of fluidity, a certain degree of heat, and the contact of the air.

There are, however, several substances, of themselves not susceptible of fermentation, which nevertheless may be brought into that state by the admixture of those that are; as by adding to them, along with a proper quantity of water, a portion of the yeast or head thrown up to the surface of fermenting liquors. Without this expedient many vegetables would run immediately into the acetous, and some of them into the putrefactive, fermentations. It is also found, that though acetous and putrefactive ferments are unable to stop the vinous fermentation, they are however capable of assimilating the liquor to their own nature in a more perfect form: and hence it is, that in the manufactures of wine, rum, and vinegar, it is found useful to keep the vessels well seasoned with the liquor intended to be prepared. Three different kinds or stages of fermentation have been generally distinguished by chemists. The vinous, which furnishes alcohol, or what is commonly called *spirit*; the acetous, which affords vinegar; and the putrefactive, which yields volatile alkali. Being generally constant in succession to each other, the whole process will be best understood by considering each of them apart. All vegetable substances are not capable of the vinous fermentation: the conditions necessary to its production are, a saccharo-mucilaginous matter; a fluidity somewhat viscous, the proper degree of which is best learned from experience; a heat from 40 to 96 of Fahrenheit's thermometer; a considerable mass of matter; and the access of the external air.

The phenomena exhibited in the vinous fermentation are, a brisk tumultuary motion, the liquor loses its transparency and homogeneous appearance, its bulk and heat are considerably increased, the solid parts are buoyed up to the top, and a great quantity of a permanently elastic fluid is disengaged. This fluid or gas being heavier than atmospheric air, floats in separate masses near the surface of the liquor; and is easily distinguishable from common air by extinguishing flame and animal life, precipitating lime from limewater, crystallising and rendering mild the caustic

caustic alkali: is the gas sylvestre of Helmont, and the fixed air, aerial acid, or carbonic acid of modern chemists. After some time the tumultuary motion in the liquor is suddenly checked, perhaps from the generation of the alcohol; a fine ley is also precipitated; and the floating matter, if not purposely prevented, subsides to the bottom of the vessel. In the wines produced from the grape, a large quantity of saline concrete is incruited on the sides and bottom of the casks; and this is commonly known by the name of *tartar*, the properties of which we shall afterwards examine. At the termination of these phenomena, the vegetable matter has assumed new properties; and from being a mild, sweet, or gently acidulous infusion, is now become the brisk, pungent, and inebriating liquor, called *wine* or *vinous liquor*.

Fermented or vinous liquors are prepared from a great variety of substances: the saccharine substances, or those rendered so by a beginning vegetation, are in general fittest for the purpose; a multitude of collateral circumstances are also necessary for the proper management of the process; and in vinous liquors great diversities are observable. These differences are not only observable in wines produced from different substances, but also in those prepared from one and the same vegetable. These diversities may be referred to the different conditions of the substance to be fermented, to the states of fluidity and heat, and to the degree of fermentation to which the subject has been carried. This last is principally modified by the preceding causes, and not unfrequently by very minute and apparently trifling circumstances in the conduct of the operator. Hence the numerous varieties in the vinous liquors produced from the grape, which have been more peculiarly denominated *wines*. It is an important part of pharmacy to inquire into these differences with care and attention.

The diversity in vinous liquors is still more obvious in those produced from different vegetables. Many of the native qualities of the substances, as colour, taste, flavour, &c. often remain in the wine; not being totally subdued by that degree of fermentation necessary for rendering the liquor vinous. Hence the remarkable difference of wines produced from the grape and the graminous seeds: the wine produced from these last has been more strictly called *beer*; and is well known to differ from wines produced from apples, pears, apricots, or any other fruit.

1. Of the Product of the VINOUS Fermentation.

The product of all these fermented vegetables is, as we have just now mentioned, the pungent and intoxicating liquor called *wine*. It is proper, however, in pharmacy, to inquire into the different principles which enter its composition. As the wine furnished by grapes is the most valuable and generally known, we shall take it as an example: Grape-wine, then, is composed of a large quantity of water, of alcohol, of tartar, and of a colouring matter. It is proper, however, that we should lay down the proofs of such a combination in wine, and explain the methods by which it may be decomposed and separated into the constituent parts above-mentioned.

For this purpose, recourse is generally had to the
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assistance of the fire. The liquor is put into an alembic; and as soon as it boils, a white milky fluid, of a pungent smell and taste, distils into the recipient. This fluid is called *aquavita*, or, in common language, *spirit*: it is compounded of water and certain matters capable of suspension in water, of alcohol, and of a small proportion of oil; which last communicates to it a milky colour: the yellow colour, afterwards assumed, is partly owing to the same oil, and partly to a solution of the extractive matter of the wooden casks in which the *aquavita* has been kept. This *aquavita*, like wine, always partakes more or less of the flavour of the vegetable from whence it has been prepared; but by farther distillation, and other processes, it is freed of its water, and of the native principles of the vegetable matter which the watery parts had kept in solution; when thus prepared, it is a pure *alcohol* or *inflammable spirit*, which is always the same from whatever vegetable the wine was produced.

After all the *aquavita* has been drawn off, the residuum now ceases to be wine; it is of a chocolate colour, of an acid and austere taste; it has now assumed a heterogeneous appearance, and a great quantity of saline crystals is observed in the liquor; these crystals are the *tartar*. By the above processes, then, we have fully decomposed *wine*: but it is to be observed, that by this analysis we have not separated the different parts of wine in their original and entire state; nor are we hitherto acquainted with any method of regenerating the wine by recombining the *aquavita* with the residuum: some product of the fermentation is therefore changed or destroyed; and this product is probably some peculiar modification of fixed air or aerial acid. The residuum, when evaporated, assumes the form and consistence of an extract; the colouring part may be abstracted by rectified spirit of wine, but is not separable from it by the addition of water: it seems therefore to be of a gummi-resinous nature, and extracted from the grape by means of the alcohol generated during the fermentation.

From this analysis, then, it is obvious, that wine is composed of water, colouring matter, alcohol, and something that is changed or lost. We shall refer the particular examination of alcohol and tartar to the proper places assigned them in this work; and we hope that from this general survey of the subject, the properties of wine, as a solvent of several medicinal substances to be afterwards examined, will be much more readily understood. Before we go farther, it is proper to add, that the *ley* precipitated from wine during fermentation, is a compound of stones, pieces of grape, tartar, and vitriolated tartar: the two first are inert bodies; the two last we shall particularly examine in their proper order. We are now prepared to consider the nature and product of the next kind or stage of fermentation, viz. the

2. ACETOUS Fermentation.

To understand the process of the acetous fermentation, we must leave for the present our analysis of the product of the vinous fermentation, and return to the wine in its most perfect and entire state. It is proper to observe, that though, after the liquor has become vinous, a partial cessation of the more obvious

M m phenomena

Plen ents.

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Water, colouring matter, alcohol, &c.

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Pr cess of acetous fermentation.

Elements.

phenomena takes place, yet the wine still suffers a slow and imperceptible degree of fermentation. We are not then to consider the liquor as being in a quiescent state, but as constantly approaching to the next stage, viz. the *acetous fermentation*, which we are now to consider. This kind of insensible fermentation, or what we may call the intermediate change, seems to be necessary to the perfection of the wine. Its degree, however, is to be regulated under certain limitations: when too much checked, as by cold, thunder, or such like causes, the wine becomes rapid; when too much encouraged by heat, contact of air, &c. it approaches too far to the acetous change: but in order that the vinous shall proceed fully to the acetous fermentation, several circumstances are required; and these are in general the same that were before necessary to the vinous stage. These conditions are, a temperate degree of heat, a quantity of unfermented mucilage, an acid matter, such as tartar, and the free access of external air. When thus situated, the liquor soon passes into the acetous fermentation: but during this stage the phenomena are not so remarkable as in the vinous; the motion of air is now less considerable, a gross unctuous matter separates to the bottom, the liquor loses its vinous taste and flavour, becomes sour, and on distillation affords no inflammable spirit. It is now the acetous acid or vinegar; and when separated by distillation from the unctuous ley, may be preserved a considerable length of time without undergoing the putrid change: to this last, however, it always approaches in the same manner as the vinous constantly verges to the acetous fermentation; and this will much more readily happen if the acid be allowed to remain with the unctuous feculent matter above-mentioned. When thus situated, the vinegar quickly loses its transparency, assumes a blackish colour, loses its sourness and agreeable odour, has an offensive taste and smell, and, when distilled at a certain period of the process, yields volatile alkali.

The liquor is now arrived to the last stage, viz.

3. The PUTREFACTIVE Fermentation.

From the preceding phenomena, it is obvious, that the same substance which is capable of the vinous and acetous, is also capable of the putrefactive, fermentation. It is perhaps impossible to induce the first without a mixture of the second; or the second without a mixture of the third. Hence every wine is a little acid; and there are few vinegars without some disposition towards putrefaction, or without volatile alkali, neutralized by the acid which predominates. Notwithstanding this seeming continuation of one and the same process, the putrefaction of vegetables has its particular phenomena. The vegetable matter, if in a fluid state, becomes turbid, and deposits a large quantity of feculent matter; a considerable number of air-bubbles are raised to the top; but their motion is not so brisk in the putrefactive as in the vinous, or even the acetous fermentation: neither the bulk nor heat of the liquor seems to be increased; but an acrid pungent vapour is perceived by the smell, and which, by chemical trials, is found to be the volatile alkali; by degrees this pungent odour is changed into one less pungent, but much more nauseous. If the same train of phenomena have taken place in a vege-

table consisting of parts somewhat solid, its cohesion is broke down into a soft pulpy mass; this mass, on drying, entirely loses its odour, leaving a black cherry-like residuum, containing nothing but earthy and saline substances.

It is proper to observe, that though the circumstances favouring the putrefactive are the same with those requisite to the vinous and acetous fermentations, yet these several conditions are not so indispensable to the former as to the two latter stages. All vegetables have more or less tendency to putrefaction, and a great number of them are capable of the acetous fermentation: but the proportion of those capable of the vinous is not considerable; and these last will run into the putrid in circumstances in which they cannot undergo the vinous or even the acetous fermentations. Thus flour made into a soft paste will become sour; but it must be perfectly dissolved in water to make it fit for the vinous stage; whereas mere dampness is sufficient to make it pass to the putrid fermentation: besides the condition of fluidity, a less degree of heat, and a more limited access of air, are sufficient for producing the putrefactive fermentation.

It is therefore probable, that all vegetables, in whatever state they may be, are liable to a kind of putrefaction: in some the change is slow and gradual, but never fails at length to break down the texture and cohesion of the most solid.

We formerly observed, that the vapours separated during the vinous fermentation were fixed air or aerial acid; and it is indeed true, that in the incipient state of this fermentation a quantity of gas is still evolved, and along with it a quantity of alkaline air: in the advanced state, however, we find these vapours of a different nature; they now tarnish silver, and render combinations of lead with the vegetable acids black. When produced in large quantity, and much confined, as happens in stacks of hay put up wet, they burst into actual flame, consuming the hay to ashes: on other occasions, the escape of these vapours discovers itself by an emission of light, as in the luminous appearance of rotten wood when placed in the dark. From the above phenomena it is evident, that these vapours abound with the principle of inflammability; and their odour probably depends on this principle loosely combined with the water, or some other parts of the volatilised matter. This gas Hydrogen is therefore different from that separated during the vinous fermentation; it is the phlogisticated, and sometimes the inflammable air of Dr Priestley, or the hydrogen of Lavoisier. See table of chemical nomenclature, &c. CHEMISTRY, page 598.

We have thus, for the sake of clearness, and in order to comprehend the whole of the subject, traced the phenomena of fermentation through its different stages: it is proper, however, to observe, that though every vegetable that has suffered the vinous will proceed to the acetous and putrefactive fermentations, yet the second stage is not necessarily preceded by the first, nor the third by the second; or in other words, the acetous fermentation is not necessarily confined to those substances which have undergone the vinous, nor the putrefactive to those which have undergone the acetous fermentation. Thus it is, that gums dissolved in water pass to the

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Vinegar.18
Phenomena
of putrefac-
tive fer-
mentation.

acetic without undergoing the vinous fermentation; and glutinous matter seems to run into putrefaction without showing any previous acceſſence: and farther, theſe changes frequently happen although the matter be under thoſe conditions which are favourable to the preceding ſtages.

From the foregoing ſketch, the importance of this ſubject in the ſtudy of Pharmacy will be obvious at firſt ſight: it cannot, however, afford us any uſeful information on the native principles of vegetables; but it preſents to us new products, the importance of which is well known in cheſtry, in medicine, and in arts. The neceſſity of being well acquainted with the ſeveral facts (for of theory we know none ſatisfactory), will appear in the pharmaceutical hiſtory and preparation of many of our moſt valuable drugs. We are next to conſider a ſet of no leſs complicated operations, viz.

II. Productions from vegetables by FIRE.

In order to analyſe, or rather to decompoſe, vegetables by the naked fire, any given quantity of dry vegetable matter is put into a retort of glaſs or earth. Having filled the veſſel about one half or two thirds, we place it in a reverberatory furnace, adapting it to a proper receiver. To collect the elaſtic fluids, which, if confined, would burſt the veſſels (and which, too, it is proper to preſerve, as being real products of the analyſis), we uſe a perforated receiver with a crooked tube, the extremity of which is received into a veſſel full of water, or of mercury, and inverted in a baſon containing the ſame fluid: by this contrivance, the liquid matters are collected in the receiver, and the aeriform fluids paſs into the inverted veſſel. If the vegetable is capable of yielding any ſaline matter in a concrete ſtate, we interpoſe between the retort and the receiver another veſſel, upon whoſe ſides the ſalt ſublimed. Theſe things being properly adjusted, we apply at firſt a gentle heat, and increaſe it gradually, that we may obſerve the different products in proper order. At firſt an inſipid watery liquor paſſes over, which is chiefly compoſed of the water of vegetation; on the heat being a little farther increaſed, this watery liquor, or phlegm, becomes charged with an oily matter, having the odour of the vegetable, if it poſſeſſed any in its entire ſtate; along with this oil we alſo obtain an acid reſembling vinegar, and which communicates to the oil ſomewhat of a ſaponaceous nature; on the heat being carried ſtill farther, we procure more acid, with an oil of a dark colour, and the colour gradually deepens as the diſtillation advances. The oil now ceases to retain the peculiar odour of the vegetable; and being ſcorched by the heat, ſends forth a ſtrong diſagreeable ſmell like tar: it is then called *em-pneumatic oil*. About this time alſo ſome elaſtic vapours ruſh into the inverted veſſel; theſe generally conſiſt of inflammable or fixed airs, and very often of a mixture of both; the volatile ſalt now alſo ſublimed, if the vegetable was of a nature to furniſh it. By the time the matter in the retort has acquired a dull red heat, nothing further will ariſe: we then ſtop; and allowing the veſſel to cool, we find a maſs of charcoal, retaining more or leſs the form and appearance of the vegetable before its decomposition.

We have thus deſcribed, in the order of their ſuc-

ceſſion, the ſeveral products obtained from the generality of vegetables when analyſed in cloſe veſſels and in a naked fire.

It is, however, to be underſtood, that the proportion of theſe principles turns out very various; the more ſucculent yield more water, and the more ſolid afford a greater quantity of the other principles. Independently alſo of this difference, the nature of the products themſelves are found to differ in different vegetables: thus in the cruciform plants, and in the emulſive and farinaceous feeds, the ſaline matter which comes over with the water and oil is found to be alkaline; ſometimes it is ammoniacal, from the combination of the acid with the volatile alkali paſſing over at the end of the proceſs; it is alſo probable, that the acids of vegetables are not all of the ſame nature, though they exhibit the ſame external marks. When volatile alkali is obtained, it is always found in the mild efferveſcing ſtate; it is procured, however, from a few vegetables only; it is ſeldom in a concrete form, being generally diſſolved in the phlegm; and as it ordinarily makes its appearance about the end of the proceſs, it is probable that its formation is owing to ſome peculiar combination of the oil and fixed alkali. The plants containing much oily combuſtible matter ſeem to be thoſe which more peculiarly yield inflammable air, while the mucilages appear to be as peculiarly fitted for affording the fixed air or aerial acid. The chemical properties of charcoal ſeem to be always the ſame from whatever vegetable it has been produced: on a minute examination (which, however, is not the buſineſs of pharmacy), it is found to conſiſt of fixed air, the principle of inflammability, a ſmall quantity of earth, ſaline matter, and a little water. The whole of the analyſis then amounts to air, water, earth, and the principle of inflammability; for by repeated diſtillations the oil is reſolved into water, the principle of inflammability, and a little earth; the ſaline matter alſo is a product ariſing from a combination of the earthy matter with water or the principle of inflammability, in ſome ſhape or other, or perhaps with both. That theſe combinations take place, has at leaſt been the opinion of the chemiſts.

We formerly ſaid that charcoal was partly compoſed of ſaline matter; it therefore remains that we ſhould next decompoſe the charcoal, in order to obtain or ſeparate the articles next to be mentioned.

The fixed Salts of Vegetables.

When vegetable charcoal has been burnt, there remains a quantity of aſhes or cinders of a blackiſh grey or white colour: theſe, when boiled or infuſed in water, communicate to it a pungent ſaline taſte; the ſalt thus held in ſolution may, by evaporation, be reduced to a concrete ſtate: this ſaline matter, however, is generally found to be mixed with ferruginous earthy and other impurities, and likewise with a number of neutral ſalts of different kinds. In this mixed condition it is the

Potashes uſed in Commerce.

This ſalt, or rather compound of different ſalts, is procured by burning large quantities of wood of any kind; and this proceſs is called *incineration*: the predominating ſalt, however, is alkaline; and as the neutral

Elements.

tral salts are obtained to better advantage by other means, they are generally neglected in the purification of potashes. Potashes, then, freed from its impurities, and separated from the other salts by processes to be hereafter mentioned, is now

The fixed vegetable Alkali.

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Fixed vegetable alkalis, characters of.

Alkalis in general are distinguished by a pungent taste, the very reverse of that of sourness; by their destroying the acidity of every sour liquor; and by their changing the blue and red colours of vegetables to a green: they attract more or less the moisture of the air, and some of them deliquesce. The fixed alkalis, which we shall at present consider more particularly, are fusible by a gentle heat: by a greater degree of heat they are dissipated; their fixity, therefore, is only relative to the other kind of alkalis, viz. the volatile: they dissolve and form glass with earths: and, lastly, when joined with acids to the point of saturation, they form what are called *Neutral Salts*.

These characters will afford some necessary and preliminary knowledge of these substances in general; and we shall afterwards find that they are sufficient to distinguish them from all other saline bodies: it is necessary, however, to examine them more minutely, for our analysis has not yet reached so far as to present them in their simplest state. Previous to the discoveries of Dr Black, the vegetable fixed alkali (which we at present speak of particularly), when separated from the foreign matters with which it is mixed in the ashes, was considered to be in its purest state: we shall afterwards find that it is still a compound body, and is really a neutral salt, compounded of pure alkali, and fixed air or the aerial acid. We presume, then, that the particular history of its chemical and medicinal properties will be better understood when we come to those processes by which it is brought to its most pure and simple state: See *CHEMISTRY*. We shall only therefore observe for the present, that fixed vegetable alkali, not only in its pure state, but also when neutralised by aerial acid, seems always to be one and the same thing, from whatever vegetable it has been produced. Those of some sea-plants must, however, be excepted: the saline matter obtained from these last is, like the former, in a mixed and impure state; it differs, however, from potashes, in containing an alkali of somewhat different properties. The cinder of sea-plants containing this alkali is called

Soda.

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Soda, or natron, whence produced.

Soda, then, as we have just now hinted, is produced by the incineration of the kali and other sea-plants: And from this impure and mixed mass of cinder, is obtained the marine, mineral, or muriatic alkali, or natron, as it is now denominated by the London College. This alkali has acquired these names, because it is the base of the common marine or sea-salt: it differs from the vegetable alkali in being more easily crystallizable; when dried, it does not like the former attract humidity sufficient to form a liquid; it is somewhat less pungent to the taste, and, according to Bergman, has less attraction for acids than the vegetable alkali.

It is, however, to be observed, that this alkali, when deprived of fixed air, that is to say, when brought

to its purest state, can scarcely, if at all, be distinguished from the vegetable alkali; and indeed the true distinction can only be formed from their combinations, each of them affording with the same acid very different neutral salts. It belonged to this place to mention some of the characters of alkalis in general, and also some of those marks by which the vegetable and mineral alkalis are distinguished from each other: but for a more particular history of their chemical and medicinal properties, we refer to an account of the pharmaceutical preparations. As the volatile alkali is rarely produced from vegetables, but is generally obtained from animal matter, we shall consider that kind of alkali when we come to analyse the animal kingdom.

Of Vegetable Earth.

After all the saline matter contained in the ashes of vegetables has been washed off by the processes before mentioned, there yet remains one insipid earthy-like powder, generally of a whitish colour, insoluble in water, and from which some iron may be attracted by the magnet. It is said to have formed alum with the vitriolic acid; a kind of selenite has also been obtained, but somewhat different from that produced by the union of the same acid with calcareous earth; this residuum of burnt vegetables differs also from calcareous earth, in not being susceptible of becoming quicklime by calcination. It has been found that this residuum, instead of an earth, is a calcareous phosphoric salt, similar to that obtained from the bones of animals.

WE have thus finished our analysis of vegetables by the naked fire; and have only to observe, that, like the analysis by fermentation, it can afford us no useful information on the native principles of the vegetable itself.

When chemistry began first to be formed into a rational science, and to examine the component parts and internal constitution of bodies, it was imagined, that this resolution of vegetables by fire, discovering us all their active principles, unclogged and unmixed with each other, would afford the surest means of judging of their medicinal powers. But on prosecuting these experiments, it was soon found that they were insufficient for that end: that the analyses of poisonous and esculent plants agreed often as nearly as the analyses of one plant: that by the action of a burning heat, two principles of vegetables are not barely separated, but altered, transposed, and combined into new forms; inasmuch that it was impossible to know in what form they existed, and with what qualities they were endowed, before these changes and transpositions happened. If, for example, 32 ounces of a certain vegetable substance are found to yield ten ounces and a half of acid liquor, above one ounce and five drams of oil, and three drams and a half of fixed alkaline salt: what idea can this analysis give of the medicinal qualities of gum Arabic?

III. SUBSTANCES naturally contained in vegetables, and separable by Art without Alteration of their native Qualities.

It has been supposed, that there is one general fluid, or blood which is common to all vegetables, and from which the fluids peculiar to particular plants and their parts are prepared by a kind of secretion: To this supposed

posed general fluid botanists have given the name of *sap*. This opinion is rendered plausible from the analogy in many other respects between vegetable and animal substances: and indeed if we consider the water of vegetation as this general fluid, the opinion is perhaps not very far from the truth; but the notion has been carried much farther than supposing it to be mere water; and the opinion of naturalists on this subject does not seem to be well supported by experience. It is difficult to extract this sap without any mixture of their constituent parts. But in a few vegetables, from which it distils by wounding their bark, we find this supposed general blood possessing properties not a little various: Thus the juice effused from a wounded birch is considerably different from that poured out from an incision in the vine.

1. Gross Oils.

Vegetables, like animals, contain an oil in two different states. That is, in several vegetables a certain quantity of oil is superabundant to their constitution, is often lodged in distinct reservoirs, and does not enter into the composition of their other principles: in most vegetables, again, another quantity of oil is combined, and makes a constituent part of their principles. Of this last we formerly spoke in our analysis of vegetables by fire; and it is the former we mean to consider, under the three following heads.

Gross oils abound chiefly in the kernels of fruits, and in certain seeds; from which they are commonly extracted by expression, and are hence distinguished by the name of *expressed oils*. They are contained also in all the parts of all vegetables that have been examined, and may be forced out by vehemence of fire; but here their qualities are much altered in the process by which they are extracted or discovered, as we have seen under the foregoing head.

These oils, in their common state, are not dissoluble either in vinous spirits or in water, though by means of certain intermedia they may be united both with the one and the other. Thus a skilful interposition of sugar renders them miscible with water into what are called *lobochs* and *oily draughts*; by the intervention of gum or mucilage they unite with water into a milky fluid: by alkaline salts they are changed into a soap, which is miscible both with water and spiritous liquors, and is perfectly dissolved by the latter into an uniform transparent fluid. The addition of any acid to the soapy solution absorbs the alkaline salt; and the oil, which of course separates, is found to have undergone this remarkable change, that it now dissolves without any intermedium in pure spirit of wine.

Expressed oils exposed to the cold lose their fluidity greatly: some of them, in a small degree of cold, congeal into a consistent mass. Kept for some time in a warm air, they become thin and highly rancid: their soft, lubricating, and relaxing quality is changed into a sharp acrimonious one: and in this state, instead of allaying, they occasion irritation; instead of obtunding corrosive humours, they corrode and inflame. These oils are liable to the same noxious alteration while contained in the original subject: hence arises the rancidity which the oily seeds and kernels, as almonds and those called the *cold seeds*, are so liable to contract in

keeping. Nevertheless, on triturating these seeds or kernels with water, the oil, by the intervention of the other matter of the subject, unites with the water, into an emulsion or milky liquor, which, instead of growing rancid, turns sour on standing.

It appears then that some kind of fermentation goes on in the progress of oils in the rancid state; and it would seem from some experiments by Mr Macquer, that an acid is evolved, which renders them more soluble in spirit of wine than before.

In the heat of boiling water, and even in a degree of heat as much exceeding this as the heat of boiling water does that of the human body, these oils suffer little dissipation of their parts. In a greater heat they emit a pungent vapour, seemingly of the acid kind; and when suffered to grow cold again, they are found to have acquired a greater degree of consistence than they had before, together with an acrid taste. In a heat approaching to ignition, in close vessels, the greatest part of the oil arises in an empyreumatic state, a black coal remaining behind.

2. Gross sebaceous matter.

From the kernels of some fruits, as that of the chocolate nut, we obtain, instead of a fluid oil, a substance of a butyraceous consistence; and from others, as the nutmeg, a solid matter as firm as tallow. These concretes are most commodiously extracted by boiling the substance in water: the sebaceous matter, liquefied by the heat, separates and arises to the surface, and resumes its proper consistence as the liquor cools.

The substances of this class have the same general properties with expressed oils, but are less disposed to become rancid in keeping than most of the common fluid oils. It is supposed by the chemists, that their thick consistence is owing to a larger admixture of an acid principle: for, in their resolution by fire, they yield a vapour more sensibly acid than the fluid oils; and fluid oils, by the admixture of concentrated acids, are reduced to a thick or solid mass.

3. Essential Oils.

Essential oils are obtained only from those vegetables, or parts of vegetables, that are considerably odorous. They are the direct principle in which the odour, and oftentimes the warmth, pungency, and other active powers of the subject, reside; whence their name of *essences* or *essential oils*.

Essential oils are secreted fluids; and are often lodged in one part of the plant, while the rest are entirely void of them. Sometimes they are found in separate spaces or receptacles; and are there visible by the naked eye: thus, in the rind of lemons, oranges, citrons, and many others, there are placed everywhere small pellucid vesicles, which, by pressing the peel near to the flame of a candle, squirt out a quantity of essential oil, forming a stream of lambent flame: hence, too, an oleosaccharum may be made, by rubbing the exterior surface of these peels with a piece of lump sugar, which at once tears open these vesicles, and absorbs their contained oil.

Essential oils unite with rectified spirit of wine, and compose with it one homogeneous transparent fluid; though some of them require for this purpose a much larger

Properties
of sebaceous
matter.

Essential
oils,
whence
obtained.

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The pro-
portion.

larger proportion of the spirit than others. The difference of their solubility perhaps depends on the quantity of disengaged acid; that being found by Mr Macquer not only to promote the solution of essential oils, but even of those of the unfixed kind. Water also, though it does not dissolve their whole substance, may be made to imbibe some portion of their more subtle matter, so as to become considerably impregnated with their flavour: by the admixture of sugar, gum, the yolk of an egg, or alkali salts, they are made totally dissoluble in water. Digested with volatile alkali, they undergo various changes of colour, and some of the less odorous acquire considerable degrees of fragrance; while fixed alkali universally impairs their odour.

The specific gravity of most of these oils is less than that of water: some of them, however, are so heavy as to sink in water; but these varieties shall be noticed when we come to their preparation.

In the heat of boiling water, these oils readily exhale; and on this principle they are commonly extracted from subjects that contain them; for no other fluid, which naturally exists in vegetables, is exhalable by that degree of heat, excepting the aqueous moisture, from which the greatest part of the oil is easily separated. Some of these oils arise with a much less heat, a heat little greater than that in which water begins visibly to evaporate. In their resolution by a burning heat, they differ little from expressed oils.

Essential oils, exposed for some time to a warm air, suffer an alteration very different from that which the expressed undergo. Instead of growing thin, rancid, and acrimonious, they gradually become thick, and at length harden into a solid brittle concrete; with a remarkable diminution of their volatility, fragrance, pungency, and warm stimulating quality. In this state, they are found to consist of two kinds of matter; a fluid oil, volatile in the heat of boiling water, and nearly of the same quality with the original oil; and of a grosser substance which remains behind, not exhalable without a burning heat, or such as changes its nature, and resolves it into an acid, an empyreumatic oil, and a black coal.

The admixture of a concentrated acid instantly produces, in essential oils, a change nearly similar to that which time effects. In making these kinds of mixtures, the operator ought to be on his guard; for when a strong acid, particularly that of nitre, is poured hastily into an essential oil, a great heat and ebullition ensue, and often an explosion happens, or the mixture bursts into flame. The union of expressed oils with acids is accompanied with much less conflict.

4. Concrete essential oil.

Some vegetables, as roses and cleampane root, instead of a fluid essential oil, yield a substance possessing the same general properties, but of a thick or fetidous consistence. This substance appears to be of as great volatility and subtilty of parts as the fluid oils; it equally exhales in the heat of boiling water, and

concretes upon the surface of the collected vapour. The total exhalation of this matter, and its concreting again into its original consistent state, without any separation of it into a fluid and a solid part, distinguishes it from essential oils that have been thickened or indurated by age or by acids.

5. Camphor.

Camphor is a solid concrete, obtained chiefly from the woody parts of certain Indian trees. See CAMPHORA (3). It is volatile like essential oils, and soluble both in oils and inflammable spirits: it unites freely with water by the intervention of gum, but very sparingly and imperfectly by the other intermedia that render oils miscible with watery liquors. It differs from the sebaceous as well as fluid essential oils, in suffering no sensible alteration from long keeping; in being totally exhalable, not only by the heat of boiling water, but in a warm air, without any change or separation of its parts, the last particle that remains unexhaled appearing to be of the same nature with the original camphor; in its receiving no empyreumatic impression, and suffering no resolution, from any degree of fire to which it can be exposed in close vessels, though readily combustible in the open air; in being dissolved by concentrated acids into a liquid form; and in several other properties which it is needless to specify in this place.

6. Aroma,

Or spiritus rector, is the name given to the odorous principle of vegetables. These bodies differ greatly from one another in the quantity, strength, and volatility of the odorous principle which they contain. It is generally found united with volatile oils; but it is soluble in alcohol and water as well as in these. The slightest degree of heat is sufficient to disengage the aroma of plants. To obtain it, the plant must be distilled in a bain-marie, and its vapours received into a cold capital, which may condense and afterwards conduct them in a fluid state into the receiver. The product is pure odoriferous water, and is known by the name of essential or distilled water. This liquor is to be considered as a solution of the aroma or odorous principle in water. When aromatic water is heated, it loses its smell in consequence of the odorous principle being more volatile than the fluid in which it was dissolved. This principle is also dissipated by exposure to the air. Many facts would induce us to believe, that the principle of smell is one of the elementary principles of volatile oils; but we are as yet almost completely ignorant of its chemical nature, properties, and combinations.

7. Resin.

Essential oils, indurated by age or acids, are called resins. When the incruated mass has been exposed to the heat of boiling water, till its more subtle part, or the pure essential oil that remained in it, has exhaled, the gross matter left behind is likewise called resin. We find,

(B) It may likewise be procured from most of the volatile oils, by volatilizing the oil in a temperature a few degrees below that which is sufficient to elevate the camphor.

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Concrete
essential
oil.

36
Character
of resin.

find, in many vegetables, resins analogous both to one and the other of these concretes; some containing a subtle oil, separable by the heat of boiling water; others containing nothing that is capable of exhaling in that heat.

Resins in general dissolve in rectified spirit of wine, though some of them much less easily than others: it is chiefly by means of this dissolvent that they are extracted from the subjects in which they are contained. They dissolve also in oils both expressed and essential; and may be united with watery liquors by means of the same intermedia which render the fluid oils miscible with water. In a heat less than that of boiling water, they melt into an oily fluid; and in this state they may be incorporated one with another. In their resolution by fire, in close vessels, they yield a manifest acid, and a large quantity of empyreumatic oil.

8. Gum.

Gum differs from the foregoing substances in being unflammable; for though it may be burnt to a coal, and thence to ashes, it never yields any flame. It differs remarkably also in the proportion of the principles into which it is resolved by fire; the quantity of empyreumatic oil being far less, and that of an acid far greater. In the heat of boiling water, it suffers no dissipation; nor does it liquefy like resins; but continues unchanged, till the heat be so far increased as to scorch or turn it to a coal.

By a little quantity of water, it is softened into a viscous adhesive mass, called *mucilage*: by a larger quantity it is dissolved into a fluid, which proves more or less glutinous according to the proportion of gum. It does not dissolve in vinous spirits, or in any kind of oil: nevertheless, when softened with water into a mucilage, it is easily miscible both with the fluid oils and with resins; which by this means become soluble in watery liquors along with the gum, and are thus excellently fitted for medicinal purposes.

This elegant method of uniting oils with aqueous liquors, which has been kept a secret in few hands, appears to have been known to Dr Grew. "I took (says he) oil of aniseeds, and pouring it upon *another body*, I so ordered it, that it was thereby turned into a perfect milk-white balsam or butter; by which means the oil became mingable with any vinous or watery liquor, easily and instantaneously dissolving therein in the form of a milk. And note, this is done without the least alteration of the smell, taste, nature, or operation of the said oil. By somewhat the same means any other stillatitious oil may be transformed into a milk-white butter, and in like manner be mingled with water or any other liquor: which is of various use in medicine, and what I find oftentimes very convenient and advantageous to be done." (*Grew of Mixture, chap. v. inf. i. § 7.*) This inquiry has lately been further prosecuted in the first volume of the Medical Observations published by a society of physicians in London; where various experiments are related, for rendering oils, both essential and expressed, and different unctuous and resinous bodies, soluble in water by the mediation of gum. Mucilages have also been used for suspending crude mercury, and some other ponderous and insoluble substances: the mercury is by this means not a little divided; but it is found that the particles

are very apt to run together or subside, if a pretty constant agitation be not kept up.

As oily and resinous substances are thus united to water by the means of gum, so gums may in like manner be united to spirit of wine by the intervention of resins and essential oils; though the spirit does not take up near so much of the gum as water does of the oil or resin.

Acid liquors, though they thicken pure oils, or render them consistent, do not impede the dissolution of gum, or of oils blended with gum. Alkaline salts, on the contrary, both fixed and volatile, though they render pure oils soluble in water, prevent the solution of gum, and of mixtures of gum and oil. If any pure gum be dissolved in water, the addition of any alkali will occasion the gum to separate, and fall to the bottom in a consistent form; if any oily or resinous body was previously blended with the gum, this also separates, and either sinks to the bottom, or rises to the top, according to its gravity.

9. Gum-resin.

By gum-resin is understood a mixture of gum and resin. Many vegetables contain mixtures of this kind, in which the component parts are so intimately united, with the interposition perhaps of some other matter, that the compound, in a pharmaceutical view, may be considered as a distinct kind or principle; the whole mass dissolving almost equally in aqueous and in spirituous liquors; and the solutions being not turbid or milky, like those of the grosser mixtures of gum and resin, but perfectly transparent. Such is the astringent matter of bistort root, and the bitter matter of gentian. It were to be wished that we had some particular name for this kind of matter; as the term *gum resin* is appropriated to the grossest mixtures, in which the gummy and resinous parts are but loosely joined, and easily separable from each other.

We shall afterwards find that it will be convenient to imitate this natural combination by art. As the effects of medicines very generally depend on their solubility in the stomach, it is often necessary to bring their more insoluble parts, such as resinous and oily matters, into the state of gum-resin: this is done, as we have mentioned in the former article, by the mediation of mucilage. By this management these matters become much more soluble in the stomach; and the liquor thus prepared is called an emulsion, from its whitish colour, resembling that of milk.

10. Saline Matter.

Of the saline juices of vegetables there are different kinds, which have hitherto been but little examined: the sweet and the acid ones are the most plentiful and the best known.

There have lately, however, been discovered a considerable variety of salts in different vegetables. The mild fixed alkali, which was formerly considered as a product of the fire, has been obtained from almost all plants by macerating them in acids; the vegetable alkali is the most common, but the mineral is also found in the marine plants. Besides the fixed alkali, several other salts have been detected in different vegetables; such as vitriolated tartar, common salt, Glauber's salt, nitre, febrifuge salt, and selenite. From some

Element. some experiments, too, the volatile alkali has been supposed to exist ready formed in many plants of the cruciform or tetradynamian tribe.

It is, however, to be understood, that though some of these salts are really products of vegetation, others of them are not unfrequently adventitious, being imbibed from the soil without any change produced by the functions of the vegetable.

The juices of vegetables, exposed to a heat equal to that of boiling water, suffer generally no other change than the evaporation of their watery parts; the saline matter remaining behind, with such of the other fixed parts as were blended with it in the juice. From many plants, after the exhalation of great part of the water, the saline matter gradually separates in keeping, and concretes into little solid masses, leaving the other substances dissolved or in a moist state; from others, no means have yet been found of obtaining a pure concrete salt.

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The salts more peculiarly native and essential to vegetables are the sweet and the sour; these two are frequently blended together in the same vegetable, and sometime pass into each other at different ages of the plant. Of the four salts several kinds are known in pharmacy and in the arts; such as those of sorrel, of lemons, oranges, citrons, &c. The saccharine salts are also obtained from a great number of vegetables; they may in general be easily discovered by their sweet taste: the sugar-cane is the vegetable from which this saline matter is procured in greatest quantity, and with most profit in commerce. For its medicinal and chemical properties, see *MATERIA MEDICA*, Art. VII.

The sweet and sour salts above-mentioned dissolve not only in water, like other saline bodies, but many of them, particularly the sweet, in rectified spirit also. The gross oily and gummy matter, with which they are almost always accompanied in the subject, dissolves freely along with them in water, but is by spirit in great measure left behind. Such heterogeneous matters as the spirit takes up, are almost completely retained by it, while the salt concretes; but of those which water takes up, a considerable part always adheres to the salt. Hence essential salts, as they are called, prepared in the common manner from the watery juices of vegetables, are always found to partake largely of the other soluble principles of the subject; while those extracted by spirit of wine are more pure. By means of rectified spirit, some productions of this kind may be freed from their impurities. Perfect saccharine concretions obtained from many of our indigenous sweets may be thus purified.

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Saline matter of benzoin.

There is another kind of saline matter obtained from some resinous bodies, particularly from benzoin, which is of a different nature from the foregoing, and supposed by some of the chemists to be a part of the essential oil of the resin, coagulated by an acid, with the acid more predominant or more disengaged than in the other kinds of coagulated or indurated oils. These concretions dissolve both in water and in vinous spirits, though difficultly and sparingly in both: they show several evident marks of acidity, have a smell like that of the resin from which they are obtained, exhale in a heat equal to that of boiling water, or a little greater, and are inflammable in the fire.

11. Farina or flour.

This substance partakes of the nature of gum, but has more taste, is more fermentable, and much more nutritive. It abounds in very many vegetables, and is generally deposited in certain parts, seemingly for the purpose of its being more advantageously accommodated to their nourishment and growth. Several of the bulbous and other roots, such as those of potatoes, briony, those from which cassava is extracted, salep, and many others, contain a great quantity of white *secule* resembling and really possessing the properties of farina. The plants of the leguminous tribe, such as peas and beans, are found also to abound with this matter. But the largest quantity of farina resides in grains, which are therefore called *farinaceous*. Of this kind are wheat, rye, barley, oats, rice, and other similar plants.

At first sight farina appears to be one homogeneous substance: it is, however, found to be a compound of three different and separable parts. To illustrate this, we shall take as an example the farina of wheat, being the vegetable which affords it in greatest quantity, and in its most perfect state. To separate these different parts we form a paste with any quantity of flour and cold water; we suspend this paste in a bag of muslin or such like cloth; we next let fall on it a stream of cold water from some height, and the bag may now and then be very gently squeezed; the water in its descent carries down with it a very fine white powder, which is received along with the water in a vessel placed below the bag: the process must be continued till no more of this white powder comes off, which is known by the water, that passes through the bag ceasing to be of a milky colour. The process being now finished, the farina is found to be separated into three different substances: the glutinous or vegeto-animal part remains in the bag; the amyllum or starch is deposited from the water which has been received in the vessel placed below the bag; and, lastly, a mucous matter is held dissolved in the same water from which the starch has been deposited: this mucous part may be brought to the consistence of honey, by evaporating the water in which it is kept in solution.

These several parts are found also to differ remarkably in their sensible and chemical properties. The vegeto-animal part is of a whitish grey colour, is a tenacious, ductile, and elastic matter, partly possessing the texture of animal membranes. Distilled in a retort, it yields, like all animal matters, a true volatile alkali; and its coal affords no fixed alkali. It is not only insoluble, but even indiffusible, in water; both which appear from its remaining in the bag after long-continued lotions. Like gums, it is insoluble in alcohol, in oils, or ether; but it is also insoluble in water, and yields on distillation products very different from those afforded by gums: it is therefore of an animal nature, and approaches perhaps nearer to the coagulable lymph of animals than to any other substance.

The fixed alkali, by means of heat, dissolves the gluten vegeto-animal; but when it is precipitated from this solution by means of acids, it is found to have lost its elasticity. The mineral acids, and especially the nitrous,

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nitrous, are also capable of dissolving the vegeto-animal part of the farina.

The starch, amyllum, or the amylaceous matter, makes the principal part of the farina. As we before noticed, it is that fine powder deposited from the water which has pervaded the entire farina: it is of a greyish white colour, but can be rendered much whiter by making it undergo a certain degree of fermentation. Starch is insoluble in cold water: but in hot water it forms a transparent glue: hence the necessity of employing cold water in separating it from the vegeto-animal part. Distilled in a retort, it yields an acid phlegm; and its coal affords, like other vegetables, a fixed alkaline salt. As starch forms the greatest part of the farina, it is probably the principal nutritive constituent in bread.

The mucous, or rather the mucoso-saccharine matter, is only in a very small quantity in bread. This substance on distillation is found to exhibit the phenomena of sugar. The use of this matter seems to be that of producing the vinous fermentation: and we may observe once for all, that the preparation of good bread probably depends on a proper proportion of the three different parts above described; viz. that the vinous fermentation is promoted by the mucoso-saccharine part, the acetous by the starch, and the putrid by the gluten vegeto-animal. From different states or degrees of these several stages of fermentation the qualities of good bread are probably derived.

12. Of the Colouring Matter of Vegetables.

The colouring matter of vegetables seems to be of an intermediate nature between the gummy and resinous parts. It is in many plants equally well extracted by water, and by rectified spirit: it is also, however, procurable in the form of a lake, not at all soluble in either of these menstrua. It would seem that the colouring matter, strictly so called, has hitherto eluded the researches of chemists. It is only the *basse* or *nidus*, in which the real colouring matter is embodied, that chemistry has as yet reached; and on the chemical properties of this *basse*, colours are capable of being extracted by different menstrua, and of being variously accommodated to the purposes of dying. The substance from which the colours of vegetables are immediately derived, is without doubt a very subtile body. Since plants are known to lose their colour when excluded from the light of the sun, there is reason to think that the immediately colouring substance is primarily derived from the matter of the sun, somewhat elaborated by vegetable life.

Many of these dyes are evolved or variously modified by chemical operations. Thus a colouring matter is somewhat deposited in the form of a *fecula* during the putrefaction of the vegetable; in others it is evolved or changed by steam, by acids, or by alkali. We may also observe, that any part of the vegetable may be the base of the colouring matter. This appears from the solubility of the different dyes in their proper menstrua; and in these solutions we have not been able to separate the real colouring matter from the base in which it is inviscated. After all, then, we must conclude, that a full investigation of this subject more properly belongs to the sublimer parts of CHE-

MISTRY, than to the business in which we are at present engaged.

The colouring drugs are considered in their proper places.

In finishing our history of the vegetable kingdom, it only remains that we should offer some

General Observations on the foregoing Principles.

1. ESSENTIAL oils, as already observed, are obtainable only from a few vegetables: but gross oil, resin, gum, and saline matter, appear to be common, in greater or less proportion, to all; some abounding more with one and others with another.

2. The several principles are in many cases intimately combined; so as to be extracted together from the subject, by those dissolvents, in which some of them separately could not be dissolved. Hence watery infusions and spirituous tinctures of a plant, contain respectively more substances than those of which water or spirit is the proper dissolvent.

3. After a plant has been sufficiently infused in water, all that spirit extracts from the residuum may be considered as consisting wholly of such matter as directly belongs to the action of spirit. And, on the contrary, when spirit is applied first, all that water extracts afterwards may be considered as consisting only of that matter of which water is the direct dissolvent.

4. If a vegetable substance, containing all the principles we have enumerated, be boiled in water, the essential oil, whether fluid or concrete, and the camphor, and volatile essential salt, will gradually exhale with the steam of the water, and may be collected by receiving the steam in proper vessels placed beyond the action of the heat. The other principles not being volatile in this degree of heat, remain behind: the gross oil and sebaceous matter float on the top: the gummy and saline substance, and a part of the resin, are dissolved by the water, and may be obtained in a solid form by straining the liquor, and exposing it to a gentle heat till the water has exhaled. The rest of the resin, still retained by the subject, may be extracted by spirit of wine, and separated in its proper form by exhaling the spirit. On these foundations most of the substances contained in vegetables may be extracted, and obtained in a pure state, however they may be compounded together in the subject.

5. Sometimes one or more of the principles is found naturally disengaged from the others, lying in distinct receptacles within the subject, or extravasated and accumulated on the surface. Thus, in the dried roots of angelica, cut longitudinally, the microscope discovers veins of resin. In the flower cups of hypericum, and the leaves of the orange-tree, transparent points are distinguished by the naked eye: which, at first view, seem to be holes, but on a closer examination are found to be little vesicles filled with essential oil. In the bark of the fir, pine, larch, and some other trees, the oily receptacles are extremely numerous, and so copiously supplied with the oily and resinous fluid, that they frequently burst, especially in the warm climates, and discharge their contents in great quantities. The acacia tree in Egypt, and the plum and cherry among ourselves, yield almost pure gummy exudations. From

Elements.

a species of ash is secreted the saline sweet substance manna; and the only kind of sugar with which the ancients were acquainted, appears to have been a natural exudation from the cane.

6. The foregoing principles are, as far as is known, all that naturally exist in vegetables; and all that art can extract from them, without such operations as change their nature, and destroy their original qualities. In one or more of these principles, the colour, smell, taste, and medicinal virtues, of the subject, are almost always found concentrated.

7. In some vegetables the whole medicinal activity resides in one principle. Thus, in sweet almonds, the only medicinal principle is a gross oil; in horse-radish root, an essential oil; in jalap root, a resin; in marsh mallow root, a gum; in the leaves of sorrel, a saline acid substance.

8. Others have one kind of virtue residing in one principle, and another in another. Thus Peruvian bark has an astringent resin and a bitter gum; wormwood a strong flavoured essential oil and a bitter gum resin.

9. The gross insipid oils and sebaceous matters, the simple insipid gums, and the sweet and acid saline substances, seem to agree both in their medicinal qualities and in their pharmaceutical properties.

10. But essential oils, resins, and gum-resins, differ much in different subjects. As essential oils are universally the principle of odour in vegetables, it is obvious that they must differ in this respect as much as the subjects from which they are obtained. Resins frequently partake of the oil, and consequently of the differences depending on it; with this further diversity, that the gross resinous part often contains other powers than those which reside in oils. Thus from wormwood a resin may be prepared, containing not only the strong smell and flavour but likewise the whole bitterness of the herb; from which last quality the oil is entirely free. The bitter, astringent, purgative, and emetic virtue of vegetables, reside generally in different sorts of resinous matter, either pure or blended with gummy and saline parts; of which kind of combinations there are many so intimate, that the component parts can scarcely be separated from each other, the whole compound dissolving almost equally in aqueous and spirituous menstrua.

11. There are some substances also, which, from their being totally soluble in water, and not in spirit, may be esteemed to be mere gums; but which, nevertheless, possess virtues never to be found in the simple gums. Such are the astringent gum called *acacia*, and the purgative gum extracted from aloes.

12. It is supposed that vegetables contain certain subtle principles different in different plants, of too great tenuity to be collected in their pure state, and of which oils, gums, and resins, are only the matrices or vehicles. This inquiry is foreign to the purposes of pharmacy, which is concerned only about grosser and more sensible objects. When we obtain from an odoriferous plant an essential oil, containing in a small compass the whole fragrance of a large quantity of the subject, our intentions are equally answered, whether the substance of the oil be the direct odorous matter, or whether it has diffused through it a fragrant principle more subtle than itself. And when this oil in long keeping loses its odour, and becomes a resin, it is

equal in regard to the present considerations, whether the effect happens from the avolation of a subtle principle, or from a change produced in the substance of the oil itself.

SECT. II. ANIMALS.

FROM the history we have already given of the vegetable kingdom, our details on animal substances may in many particulars be considerably abridged. All animals are fed on vegetables, either directly or by the intervention of other animals. No part of their substance is derived from any other source except water. The small quantity of salt used by man and some other animals, is only necessary as a seasoning or stimulus to the stomach. As the animal then is derived from the vegetable matter, we accordingly find that the former is capable of being resolved into the same principles as those of the latter. Thus, by repeated distillations, we obtain from animal substances, water, oil, air, an easily destructible salt, and charcoal. These secondary principles are by farther processes at length resolvable into the same proximate principles which we found in vegetables, viz. water, air, earth, and the principle of inflammability. But though the principles of vegetable and animal substances are fundamentally the same, yet these principles are combined in a very different manner. It is exceedingly rare that animal substances are capable of the vinous or acetous fermentations; and the putrefactive, into which they run remarkably fast, is also different in some particulars from the putrefaction of vegetables; the escape of the phlogiston in the form of light is more evident, and the smell is much more offensive, in the putrefaction of animal than of vegetable substances. The putrefaction of urine is indeed accompanied with a peculiar fetor, by no means so intolerable as that of other animal matters: this we suppose to be owing to the pungency derived from the volatile alkali, and also to the urine containing less inflammable matter than the blood and many other fluids. When analysed by a destructive heat, animals afford products very different from those of vegetables: the empyreumatic oil has a particular and much more fetid odour; and the volatile salt, instead of being an acid, as it is in most vegetables, is found in animals to be a volatile alkali. Chemists have spoken of an acid procurable from animal substances; and indeed certain parts of animal bodies are found to yield a salt of this kind; but it by no means holds with animal substances in general; and though the proofs to the contrary were even conclusive, it is confessedly in so small a quantity as not to deserve any particular regard. In some animals, however, an acid exists, uncombined and ready formed in their bodies. This is particularly manifest in some insects, especially ants, from which an acid resembling the acetous has been procured by boiling them in water. The solid parts of animal bodies, as the muscles, teguments, tendons, cartilages, and even the bones, when boiled with water, give a gelatinous matter or glue resembling the vegetable gums, but much more adhesive. We must, however, except the horny parts and the hair, which seem to be little soluble either in water or in the liquors of the stomach. The acids, the alkalis, and quicklime, are also found to be powerful solvents of animal matters. It is from the solid parts

parts that the greatest quantity of volatile alkali is obtained; it arises along with a very fetid empyreumatic oil, from which it is in some measure separated by repeated rectifications. This salt is partly in a fluid, and partly in a concrete state; and from its having been anciently prepared in the greatest quantity from the horns of the hart, it has been called *salt* or *spirit of hartshorn*. Volatile alkali is, however, procurable from all animals, and from almost every part of animal bodies except fat. Though we are sometimes able to procure fixed alkali from an animal cinder, yet it is probable that this salt did not make any part of the living animal, but rather proceeded from the introduction of some saline matter, incapable of being assimilated by the functions of the living creature.

In speaking of the fluid parts of animals, we should first examine the general fluid, or blood, from whence the rest are secreted. The blood, which at first sight appears to be an homogeneous fluid, is composed of several parts, easily separable from each other, and which the microscope can even perceive in its uncoagulated state. On allowing it to stand at rest, and to be exposed to the air, it separates into what are called the *crassamentum* and the *serum*. The crassamentum, or cruor, chiefly consists of the red globules, joined together by another substance, called the *coagulable lymph*: the chemical properties of these globules are not as yet understood; but they seem to contain the greatest quantity of the iron found in the blood. The serum is a yellowish subviscid liquor, having little sensible taste or smell: at a heat of 160 of Fahrenheit, it is converted into a jelly. This coagulation of the serum is also owing to its containing a matter of the same nature with that in the crassamentum, viz. the coagulable lymph: whatever then coagulates animal blood, produces that effect on this concrescible part. Several causes, and many different substances, are capable of effecting this coagulation; such as contact of air, heat, alcohol, mineral acids, and their combinations with earths, as alum, and some of the metallic salts. The more perfect neutral salts are found to prevent the coagulation, such as common salt and nitre.

Of the fluids secreted from the blood, there are a great variety in men and other animals. The excrementitious and redundant fluids are those which afford in general the greatest quantity of volatile alkali and empyreumatic oil: there are also some of the secreted fluids, which, on a chemical analysis, yield products in some degree peculiar to themselves. Of this kind is the urine, which is found to contain in the greatest abundance the noted salt formed from the phosphoric acid and volatile alkali. The fat, too, has been said to differ from the other animal matters, in yielding by distillation a strong acid, but no volatile alkali. There is also much variety in the quantity and state of the combination of the saline and other matters in different secreted fluids. But for a fuller investigation of this and other parts of the subject, we refer to ANATOMY, CHEMISTRY, and PHYSIOLOGY; with which it is more immediately connected than with the elements of pharmacy.

Animal oils and fats, like the gross oils of vegetables, are not of themselves soluble either in water or vinous spirits: but they may be united with water by the intervention of gum or mucilage. Most of them

may be changed into soap, by fixed alkaline salts; and be thus rendered miscible with spirit as well as water.

The odorous matter of some odoriferous animal-substances, as musk, civet, castor, is, like essential oil, soluble in spirit of wine, and volatile in the heat of boiling water. Carthusius relates, that from castor an actual essential oil has been obtained in a very small quantity, but of an exceedingly strong diffusive smell.

The vesicating matter of cantharides, and those parts of sundry animal substances in which their peculiar taste resides, are dissolved by rectified spirit, and seem to have some analogy with resins and gummy resins.

The gelatinous principle of animals, like the gum of vegetables, dissolves in water, but not in spirit or in oils: like gums also, it renders oils and fats miscible with water into a milky liquor.

Some insects, particularly the ant, are found to contain an acid juice, which approaches nearly to the nature of vegetable acids.

There are, however, sundry animal juices, which differ greatly, even in these general kinds of properties, from the corresponding ones of vegetables. Thus animal serum, which appears analogous to vegetable gummy juices, has this remarkable difference, that though it mingles uniformly with cold or warm water, yet on considerably heating the mixture, the animal-matter separates from the watery fluid, and concretes into a solid mass. Some physicians have been apprehensive, that the heat of the body, in certain diseases, might rise to such a degree, as to produce this dangerous or mortal concretion of the serous humours: but the heat requisite for this effect is greater than the human body appears capable of sustaining, being nearly about the middle point between the greatest human heat commonly observed and that of boiling water.

The soft and fluid parts of animals are strongly disposed to run into putrefaction; they putrefy much sooner than vegetable matters; and when corrupted, prove more offensive.

This process takes place, in some degree, in the bodies of living animals, as often as the juices stagnate long, or are prevented, by an obstruction of the natural emunctories, from throwing off their more volatile and corruptible parts.

During putrefaction, a quantity of air is generated; all the humours become gradually thinner, and the fibrous parts more lax and tender. Hence the tympany, which succeeds the corruption of any of the viscera, or the imprudent suppression of dysenteries by astringents; and the weakness and laxity of the vessels observable in scurvy, &c.

The crassamentum of human blood changes by putrefaction into a dark livid-coloured liquor; a few drops of which tinge the serum with a tawny hue, like the ichor of sores and dysenteric fluxes, as also the white of the eye, the saliva, the serum of blood drawn from a vein, and the liquor that oozes from a blister in deep scurvy and the advanced state of malignant fevers.

The putrid crassamentum changes a large quantity of recent urine to a flame-coloured water; so common in fevers and in the scurvy. This mixture, after standing an hour or two, gathers a cloud resembling what is seen in the crude water of acute dysentery, with some

oily matter on the surface like the scum which floats on scorbutic urine.

The serum of the blood deposites, in putrefaction, a sediment resembling well-digested pus, and changes to a faint olive-green. A serum so far putrefied as to become green, is perhaps never to be seen in the vessels of living animals; but in dead bodies this serum is to be distinguished by the green colour which the flesh acquires in corrupting. In salted meats, this is commonly ascribed to the brine, but erroneously; for that has no power of giving this colour, but only of qualifying the taste, and in some degree, the ill effects of corrupted aliments. In foul ulcers and other sores, where the serum is left to stagnate long, the matter is likewise found of this colour, and is then always acrimonious.

The putrefaction of animal substances is prevented or retarded by most saline matters, even by the fixed and volatile alkaline salts, which have generally been supposed to produce a contrary effect. Of all the salts that have been made trial of, sea-salt seems to resist putrefaction the least; in small quantities it even accelerates the process. The vegetable bitters, as chamomile flowers, are much stronger antiseptics, not only preserving flesh long uncorrupted, but likewise somewhat correcting it when putrid: the mineral acids have this last effect in a more remarkable degree. Vinous spirits, aromatic and warm substances, and the acrid plants, falsely called *alkalescent*, as scurvy-grass and horse-radish, are found also to resist putrefaction. Sugar and camphor are found to be powerfully antiseptic. Fixed air, or the aerial acid, is likewise thought to resist putrefaction; but above all the vapours of nitrous acid, in the form of air (the nitrous air of Dr Priestley), is found to be the most effectual in preserving animal bodies from corruption. The list of the septics, or of those substances that promote putrefaction, is very short; and such a property has only been discovered in calcareous earths and magnesia, and a very few salts, whose bases are of these earths.

It is observable, that notwithstanding the strong tendency of animal matters to putrefaction, yet broths made from them, with the admixture of vegetables, instead of putrefying turn sour. Sir John Pringle has found, that when animal flesh in substance is beaten up with bread or other farinaceous vegetables, and a proper quantity of water, into the consistence of a pap, this mixture likewise, kept in a heat equal to that of the human body, grows in a little time sour; while the vegetable matters, without the flesh, suffer no such change.

It was observed in the preceding section, that some few vegetables, in the resolution of them by fire, discover some agreement in the matter with bodies of the animal kingdom; yielding a volatile alkaline salt in considerable quantity, with little or nothing of the acid or fixed alkali, which the generality of vegetables afford. In animal substances also, there are some exceptions to the general analysis: from animal fats, as we before observed, instead of a volatile alkali, an acid liquor is obtained; and their empyreumatic oil wants the peculiar offensiveness of the other animal oils.

SECT. III. MINERALS.

I. OILS and BITUMENS.

In the mineral kingdom is found a fluid oil called *naphtha* or *petroleum*, floating on the surface of waters, or issuing from clefts of rocks, particularly in the eastern countries, of a strong smell, very different from that of vegetable or animal oils, limpid almost as water, highly inflammable, not soluble in spirit of wine, and more averse to union with water than any other oils.

There are different sorts of these mineral oils, more or less tinged, of a more or less agreeable, and a stronger or weaker, smell. By the admixture of concentrated acids, which raise no great heat or conflict with them, they become thick, and at length consistent; and in these states are called *bitumens*.

These thickened or concreted oils, like the corresponding products of the vegetable kingdom, are generally soluble in spirit of wine, but much more difficultly, more sparingly, and for the most part only partially; they liquefy by heat, but require the heat to be considerably stronger than vegetable products. Their smells are various; but all of them, either in the natural state, when melted or set on fire, yield a peculiar kind of strong scent, called from them *bituminous*.

The solid bitumens are, amber, jet, asphaltum, or bitumen of Judea, and fossil or pit coal. All these bitumens, when distilled, give out an odorous phlegm, or water, more or less coloured and saline; an acid, frequently in a concrete state; an oil, at first resembling the native petroleum, but soon becoming heavier and thicker; and, lastly, a quantity of volatile alkali is obtained: the residuum is a charry matter, differing in its appearances according to the nature of the bitumen which had been analysed.

From the observations of several naturalists, it is probable that all bitumens are of vegetable and animal origin; that the circumstances by which they differ from the resinous and other oily matters of vegetables and animals, are the natural effects of time, or of an alteration produced on them by mineral acids; or perhaps they are the effect of both these causes combined. This opinion is the more probable, since bitumens, on a chemical analysis, yield oil and volatile alkali; neither of which are found in any other minerals.

II. EARTHS.

The little impropriety of joining the vegetable and animal earths to the mineral, must be overlooked for the sake of bringing both under one synoptical view. Under the mineral earths are included stones; these being no other than earths in an indurated state.—The different kinds of these bodies hitherto taken notice of are the following.

1st, *Earths soluble in the nitrous, marine, and vegetable acids, but not at all, or exceeding sparingly, in the vitriolic acid. When previously dissolved in other acids, they are precipitated by the addition of this last, which thus unites with them into insipid, or nearly insipid concretes, not dissoluble in any liquor.*

Of this kind are,

1. The mineral calcareous earth: *distinguished by its being convertible in a strong fire, without addition, into an acrimonious calx called quicklime.* This earth occurs in a variety of forms in the mineral kingdom: the fine soft chalk, the coarser limestones, the hard marbles, the transparent spars, the earthy matter contained in waters, and which separating from them incrustates the sides of the caverns, or hangs in icicles from the top, receiving from its different appearances different appellations. How strongly soever some of these bodies have been recommended for particular medicinal purposes, they are fundamentally no other than different forms of this calcareous earth; simple pulverization depriving them of the superficial characters by which they were distinguished in the mass. Most of them generally contain a greater or less admixture of some of the indissoluble kinds of earth; which, however, affects their medicinal qualities no otherwise than by the addition which it makes to their bulk. Chalk appears to be one of the purest; and is therefore in general preferred. They all burn into a strong quicklime: in this state a part of them dissolves in water, which thus becomes impregnated with the astringent and lithontriptic powers that have been erroneously ascribed to some of the earths in their natural state.

During the calcination of calcareous earths, a large quantity of elastic vapour is discharged: the absence of this fluid is the cause of the causticity of quicklime, and of its solubility in water in the form of lime-water. For a more full inquiry into this subject, see FIXED AIR, &c.

2. The animal calcareous earth: *burning into quicklime like the mineral.* Of this kind are oyster-shells and all the marine shells that have been examined; though with some variation in the strength of the quicklime produced from them.

3. The earth of bones and horns: *not at all burning into quicklime.* This kind of earth is more difficult of solution in acids than either of the preceding. It is accompanied in the subjects with a quantity of gelatinous matter, which may be separated by long boiling in water, and more perfectly by burning in the open air. The earth may be extracted also from the bone or horn, though difficultly, by means of acids; whereas vegetables and the soft parts of animals yield their pure earth by burning only.

2d, *Earths soluble with ease in the vitriolic as well as other acids, and yielding, in all other combinations therewith, saline concretes soluble in water.*

1. Magnesia alba: *composing with the vitriolic acid a bitter purgative salt.* This earth has not yet been found naturally in a pure state. It is obtained from the purging mineral waters and their salts; from the bitter liquor which remains after the crystallization of sea-salt from sea-water; and from the fluid which remains uncrystallized in the putrefaction of some sorts of rough nitre. The ashes of vegetables appear to be nearly the same kind of earth.

2. Aluminous earth: *composing with the vitriolic acid a very astringent salt.* This earth also has not been found naturally pure. It is obtained from alum; which is no other than a combination of it with the vitrio-

lic acid; it may likewise be extracted, by strong boiling in that acid, from clays and boles.

3d, *Earths which by digesting in acids, either in the cold or in a moderate warmth, are not at all dissolved.*

1. Argillaceous earth: *becoming hard, or acquiring an additional hardness, in the fire.* Of this kind of earth there are several varieties, differing in some particular properties: as the purer clays, which when moistened with water form a very viscous mass, difficultly diffusible through a larger quantity of the fluid, and slowly subsiding from it; boles, less viscous, more readily miscible with water, and more readily subsiding; and ochres, which have little or nothing of the viscosity of the two foregoing, and are commonly impregnated with a yellow or red ferruginous calx.

2. Crystalline earth: *naturally hard, so as to strike sparks with steel; becoming friable in a strong fire.* Of this kind are flints, crystals, &c. which appear to consist of one and the same earth, differing in the purity, hardness, and transparency of the mass.

3. Gypseous earth: *reducible by a gentle heat into a soft powder, which unites with water into a mass, somewhat viscous and tenacious while moist, but quickly drying and becoming hard.* A greater heat deprives the powder of this property, without occasioning any other alteration. Such are the transparent selenites; the fibrous stony masses improperly called English talc; and the granulated gypsa or plaster of Paris stones. Though these bodies, however, have been commonly thought to be mere earths, of a distinct kind from the rest, they appear, both from analytical and synthetical experiments, to be no other than combinations of the mineral calcareous earth with vitriolic acid.

4. Talky earth: *scarcely alterable by a vehement fire.* The masses of this earth are generally of a fibrous or leafy texture; more or less pellucid, bright or glittering, smooth and unctuous to the touch; too flexible and elastic to be easily pulverised; soft, so as to be cut with a knife. In these respects some of the gypseous earths nearly resemble them, but the difference is readily discovered by fire; a weak heat reducing the gypseous to powder, while the strongest makes no other alteration in the talky, than somewhat diminishing their flexibility, brightness, and unctuousity.

III. METALS.

Of metals, the next division of mineral bodies, the most obvious characters are, their peculiar bright aspect, perfect opacity, and great weight; the lightest of them is fix, and the heaviest upwards of 19 times heavier than an equal bulk of water.

To understand the writers in chemistry, it is proper to be informed, that metals are subdivided into the *perfect*, the *imperfect*, and the *semimetals*.

Those possessed of ductility and malleability, and which are not sensibly altered by very violent degrees of heat, are called *perfect metals*: Of these there are three; gold, silver, and platina. It is, however, probable, that the mark of their indestructibility by fire is only relative: and indeed modern chemists have been able, by a very intense degree of heat, to bring gold into the state of a calx, or something very nearly resembling it.

Those metallic substances which possess the distinctive properties of the perfect metals, but in a less degree, are called the *imperfect metals*: These are, copper, iron, tin, lead.

Lastly, those bodies having the metallic characters in the most imperfect state, that is to say, those which have no ductility and the least fixity in the fire, are distinguished by the name of *semi-metals*: These are, regulus of antimony, bismuth, zinc, regulus of cobalt, nickel, and regulus of arsenic; which last might be rather considered as the boundary between the metallic and the saline bodies.

Mercury has been generally ranked in a class by itself.

All metallic bodies, when heated in close vessels, melt or *fuse*. This *fusion* takes place at different degrees of heat in different metals; and it does not appear that this process produces any change in the metals, provided it be conducted in close vessels. Metals, exposed to the combined action of air and fire, are converted into an earth-like substance called *calx*: by this process, which we call *calcination*, the metal suffers remarkable changes. From the distinctive marks we have before given of the metallic bodies, it will be obvious, that the perfect metals are most slowly, the imperfect more quickly, and the semi-metals most easily and soonest, affected in this operation. This earth-like powder, or *calx*, is found to possess no metallic aspect, but is considerably heavier than the metal before its calcination: it has no longer any affinity with metallic bodies, nor even with the metal from which it has been produced.

Besides this method of calcining metals by air and fire, they may likewise be brought into the state of a *calx*, by dissolving them in acids, from which they may be afterwards freed by evaporating the acid, or by adding to the solution an alkaline salt. Metals are also sometimes dephlogisticated by detonation with nitre. This change in their obvious properties is generally accompanied with a remarkable alteration in their medicinal virtues: thus quicksilver, which taken into the body in its crude state and undivided, seems inactive; proves, when calcined by fire, even in small doses, a strong emetic and cathartic, and in smaller ones, a powerful alterative in chronic disorders; while regulus of antimony, on the contrary, is changed by the same treatment, from a high degree of virulence to a state of inactivity.

Calces of mercury and arsenic exhale in a heat below ignition: those of lead and bismuth, in a red or low white heat, run into a transparent glass; the others are not at all vitrescible, or not without extreme vehemence of fire. Both the calces and glasses recover their metallic form and qualities again by the skilful addition of any kind of inflammable substance that does not contain a mineral acid. This recovery of the metallic calces into the metallic form is called *reduction*. During this process an elastic aerial fluid escapes, which is found to be *pure air*.

Is the conversion of metals into calces owing to the discharge of phlogiston, or to the absorption of pure air? And is the reduction to be ascribed to the absorption of phlogiston, or to the escape of pure air? And again, Is the calcination to be explained by the discharge of phlogiston and consequent precipitation

of pure air? And is the reduction effected by the absorption of phlogiston, either furnished by inflammable bodies or precipitated in consequence of the discharge of pure air? On these questions there is much dispute among modern chemists: We thought it only necessary to state them here, as a full inquiry into the subject is by no means the province of pharmacy. We, however, think it prudent to retain the doctrine of Stahl: and we do this the more readily, because it has been followed in our article CHEMISTRY, and because it is abundantly clear in its illustration of the pharmaceutical processes. We do not mean, however, to reject any modern discovery which may serve to illustrate our subjects.

All metallic bodies dissolve in acids; some only in particular acids, as silver and lead in the nitrous: some only in compositions of acids, as gold in a mixture of the nitrous and marine: and others, as iron and zinc, in all acids. Some likewise dissolve in alkaline liquors, as copper: and others, as lead, in expressed oils. Fused with a composition of sulphur and fixed alkaline salt, they are all, except zinc, made soluble in water.

All metallic substances, dissolved in saline liquors, have powerful effects in the human body, though many of them appear in their pure state to be inactive. Their activity is generally in proportion to the quantity of acid combined with them: Thus lead, which in its crude form has no sensible effect, when united with a small portion of vegetable acid into ceruss, discovers a low degree of the styptic and malignant quality, which it so strongly exerts when blended with a larger quantity of the same acid into what was called *faeciarum saturni*, but now more properly *sal plumbi*, or *plumbum acetatum*: and thus mercury, with a certain quantity of the marine acid, forms the violent corrosive sublimite, which by diminishing the proportion of acid becomes the mild medicine called *mercurius dulcis*.

IV. ACIDS.

The salts of this order are very numerous; but as we are at present treating of *Minerals*, it is only therefore the mineral or *fossil* acids we mean to speak of in this place.

These are distinguished by the names of the concretes from which they have been principally extracted; the *vitriolic* from vitriol, the *nitrous* from nitre or saltpetre; and the *marine* or *muratic* from common sea-salt. The form they are generally in, is that of a watery fluid: They have all a remarkable attraction for water: They imbibe the humidity of the air with rapidity and the generation of heat. Although heat be produced by their union with water, yet when mixed with ice in a certain manner, they generate a prodigious degree of cold. Acids change the purple and blue colours of vegetables to a red: they resist fermentation; and lastly, they impress that peculiar sensation on the tongue called *sourness*, and which their name imports. But it is to be observed, that they are all highly corrosive, inasmuch as not to be safely touched, unless largely diluted with water, or united with such substances as obtund or suppress their acidity. Mixed hastily with vinous spirits, they raise a violent ebullition and heat, accompanied with a copious discharge of noxious fumes: a part of

ent. unites intimately with the vinous spirit into a new compound, void of acidity, called *dulcified spirit*. It is observable, that the marine acid is much less disposed to this union with spirit of wine than either of the other two; nevertheless, many of the compound salts resulting from the combination of earthy and metallic bodies with this acid, are soluble in that spirit, while those with the other acids are not. All these acids effervesce strongly with alkaline salts both fixed and volatile, and form with them neutral salts; that is, such as discover no marks either of an acid or alkaline quality.

The nitrous and marine acids are obtained in the form of a thin liquor; the acid part being blended with a large proportion of water, without which it would be diffused into an incoercible vapour: the vitriolic stands in need of so much less water for its condensation as to assume commonly an oily consistence (whence it is called *oil of vitriol*), and in some circumstances even a solid one. Alkaline salts, and the soluble earths and metals, absorb from the acid liquors only the pure acid part: so that the water may now be evaporated by heat, and the compound salt left in a dry form.

From the coalition of the different acids with the three different alkalis, and with the several soluble earths and metallic bodies, result a variety of saline compounds; the principal of which shall be particularised in the sequel of this article.

The vitriolic acid, in its concentrated liquid state, is much more ponderous than the other two; it emits no visible vapour in the heat of the atmosphere, but imbibes moisture which increases its weight: the nitrous and marine emit copious corrosive fumes, the nitrous yellowish red, and the marine white ones. If bottles containing the three acids be stoppt with cork, the cork is found in a little time tinged black with the vitriolic, corroded into a yellow substance by the nitrous, and into a whitish one by the marine.

It is above laid down as a character of one of the classes of earths, that the vitriolic acid precipitates them when they are previously dissolved in any other acid: it is obvious, that on the same principle this particular acid may be distinguished from all others. This character serves not only for the acid in its pure state, but likewise for all its combinations that are soluble in water. If a solution of any compound salt, whose acid is the vitriolic, be added to a solution of chalk in any other acid, the vitriolic acid will part from the substance with which it was before combined, and join itself to the chalk, forming therewith a compound; which, being no longer soluble in the liquor, renders the whole milky for a time, and then gradually subsides.

This acid may be distinguished also, in compound salts, by another criterion not less strongly marked: If any salt containing it be mixed with powdered charcoal, and the mixture exposed in a close vessel to a moderately strong fire, the acid will unite with the directly inflammable part of the charcoal, and compose therewith a genuine sulphur. Common Brimstone is no other than a combination of the vitriolic acid with a small proportion of inflammable matter. With any kind of inflammable matter which is not volatile in close vessels, as the coal of vegetables, of animals, or

of bitumens, this acid composes always the same identical sulphur.

The nitrous acid also, with whatever kind of body it be combined, is both distinguished and extricated by means of any inflammable substance being brought to a state of ignition with it. If the subject be mixed with a little powdered charcoal and made red hot, a deflagration or fulmination ensues, that is, a bright flame with a hissing noise; and the inflammable matter and the acid being thus consumed or dissipated together, there remains only the substance which was before combined with the acid, and the small quantity of ashes afforded by the coal.

These properties of the nitrous acid deflagrating with inflammable substances, and of the vitriolic forming sulphur with them, serve not only as criteria of the respective acids in the various forms and disguises, but likewise for discovering inflammable matter in bodies, when its quantity is too small to be sensible on other trials.

All these acids will be more particularly examined when we come to treat of each of them apart. There are, however, a few other mineral acids which are of importance to be known: these are, *aqua regia*; *acid of borax*; *sparry acid*; and, lastly, *fixed air*, which has of late been called *aërial acid*, or *acid of chalk*.

Aqua regia has been generally prepared by a mixture of certain proportions of the nitrous and muriatic acids. It is of little avail in pharmacy whether we consider it as a distinct acid, or only as a modification of the muriatic. It has been found, that the muriatic acid when distilled with *manganese* (a peculiar fossil substance, showing a remarkable attraction to phlogiston), suffers a change which renders it capable of dissolving gold and platina. Whether this change be produced by the acid acquiring a redundancy of pure air, or by its being deprived of phlogiston, it is not our business to decide. This experiment, however, renders it probable, that the nitrous acid in the common *aqua regia* is only subservient to accomplishing the same change in the muriatic acid which is produced by distilling that acid with *manganese*.

As *aqua regia* has been only used in the nicer operations in chemistry, and in the art of assaying, we think it unnecessary to say more of it in this place.

The *acid of borax*, or *sedative salt of Homer*, may be extracted from borax, a neutral salt, whose base is mineral alkali. It has also been found native in the waters of several lakes in Tuscany. It is a light, crystallized, concrete salt; its taste is sensibly acid; it is difficultly soluble in water; but the solution changes blue vegetable colours to a red. With vitrescent earths it fuses into a white glass: it unites with the other alkalis, with magnesia, and with quicklime. The salts resulting from these combinations are very imperfectly known. The salt has been called *sedative*, from its supposed virtues as an anodyne and refrigerant remedy; but modern physicians have very little faith in this once celebrated drug.

The *sparry acid* is so called from its being extracted from a fossil called *sparry stone*, or *crystalline stone*. It is not yet determined whether it be a distinct acid; and as it has not yet been employed for any purpose in pharmacy, we think it would be improper to attempt any farther account of it here.

Elements.

Besides the acids above-mentioned, there have also been discovered acids seemingly of a particular nature, in amber, in arsenic, and in black-lead: but as these have not hitherto been applied to any use in pharmacy, they cannot properly have a place in this article.

We now come to the last, but perhaps the most generally diffused, acid in nature: this is the aerial acid, or

Fixed Air.

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Nature of
fixed air,
&c.

In our pharmaceutical history of this body, we shall only make use of the two names *fixed air* and *aerial acid*, being those most generally used, and which in our opinion are most applicable to our own subject. Fixed air is a permanently elastic fluid, being only *fixed* when in a state of combination with calcareous earth or other substances from which it may be extricated. It has received many different names, according to the substances from which it is disengaged, and to the different opinions concerning its nature: it is the *gas silvestre* of Helmut, the *fixed air* of Dr Black, the *acid of chalk*, *calcareous gas*, *mephitic gas*, *mephitic acid*, and *aerial acid*, of many modern chemists. In accommodating our account of it to the purposes of pharmacy, it is most convenient to consider it as an acid. The aerial acid may be extricated by heat, or by other acids, from all calcareous earths; that is, from all those earths which by calcination are converted into quicklime; such as chalk, marble, limestone, sea-shells, &c. It is likewise extricated from mild, fixed, and volatile alkalis, and from magnesia alba. Thus, if the vitriolic, or almost any other acid, be added to a quantity of calcareous earth or mild alkali, a brisk effervescence immediately ensues; the fixed air, or aerial acid, is discharged in bubbles; and the other acid takes its place. If this process be conducted with an apparatus to be afterwards described, the aerial acid, now separated from the calcareous earth, may be received and preserved in close vessels. When thus disengaged, it assumes its real character, viz. that of a *permanently elastic fluid*. Fixed air is also separated in great quantity during the vinous fermentation of vegetable matters. When a calcareous earth is deprived of this acid by heat, it is converted into the caustic substance *quicklime*. When alkalis, fixed or volatile, are deprived by any means of their aerial acid, they are rendered much more caustic, incapable of crystallization, or of effervescing with other acids. They are also in this *deacrated* state much more powerful in dissolving other bodies. By recombining this acid with quicklime, calcined magnesia, or alkali, any of which had been deprived of it, these substances again assume their former weight and properties. These bodies, then, when combined with aerial acid, are called *mild*; as *mild calcareous earth*, *mild alkali*, &c.: and when deprived of this acid they are called *caustic*; as *caustic calcareous earths*, *caustic alkali*, &c.: but as magnesia is not rendered caustic by calcination, there would perhaps be less danger in calling them *aerated* and *deacrated*. The aerial acid is more disposed to unite with caustic calcareous earth (quicklime) than with any other substance; next to that, its attraction is for fixed alkali, then for magnesia, and lastly for volatile alkali. We shall afterwards find that these relative powers of the different substances to unite

with this acid, lay the foundation of many important processes in pharmacy.

When we pour a small quantity of the aerial acid into lime-water, the liquor instantly assumes a white colour, and the lime gradually precipitates, leaving the water clear and tasteless: the lime in this experiment has absorbed the acid, and has therefore become *mild* or *aerated* earth. The aerial acid is capable of being absorbed by water, and the water thus impregnated precipitates lime in lime-water; but if a certain larger quantity of this impregnated water be added, the lime is redissolved, and the liquor recovers its transparency. Water impregnated with aerial acid is capable of dissolving iron; and in this way are formed native and artificial chalybeate waters. Zinc is also soluble in the same liquor. This acid is easily expelled from the water by removing the pressure of the atmosphere, by boiling, and even by time alone, if the vessel be not kept close shut. Fixed air extinguishes flame, vegetable and animal life, and ought therefore to be cautiously managed: like other acids it changes the blue colours of vegetables to a red, and communicates an acidulous taste to the water impregnated with it. The attraction of the aerial acid, even to quicklime, is but feeble; as we know of no other acids whatever that are not able to disengage it.

From these several facts it will appear obvious, that *mild* or *effervescing alkalis*, whether fixed or volatile, are really neutral salts, compounded of the aerial acid and pure alkali: like other acids, it unites with these bodies, diminishes their causticity, and effects their crystallization. In speaking, therefore, of *pure alkali*, we ought to confine ourselves to those in the *caustic* or *deacrated* state; or, in other words, to those which are deprived of their fixed air or aerial acid, with which they formed a compound salt. Many other properties of this acid might be mentioned, but we have now noticed all those which we thought were concerned in the business of pharmacy. We shall have occasion to recur to the subject when we come to the preparation of several compound drugs.

Let us next take a view of what passes in the combinations of acids with different substances.

If a fixed alkaline salt be united with a vegetable acid, as vinegar, and formed into a neutral salt, on adding to this compound some marine acid, the acetous acid will be disengaged, so as to exhale totally in a moderate heat, leaving the marine in possession of the alkali: the addition of the nitrous will in like manner dispossess the marine, which now arises in its proper white fumes, though without such an addition it could not be extricated from the alkali by any degree of heat: on the addition of the vitriolic acid, the nitrous gives way in its turn, exhaling in red fumes, and leaving only the vitriolic acid and the alkali united together.

Again, if any metallic body be dissolved in an acid, the addition of any earthy body that is dissoluble in that acid will precipitate the metal: a volatile alkaline salt will in like manner precipitate the earth: and a fixed alkali will dislodge the volatile; which last being readily exhaled by heat, the remaining salt will be the same as if the acid and fixed alkali had been joined together at first, without the intervention of any of the other bodies.

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The power in bodies on which these various transpositions and combinations depend, is called by the chemists *affinity* or *elective attraction*; a term, like the Newtonian *attraction*, designed to express not the cause, but the effect. When an acid spontaneously quits a metal to unite with an alkali, they say it has a greater *affinity* or *attraction* to the alkali than to the metal: and when, on the contrary, they say it has a greater affinity to fixed alkali than to the volatile, they mean only that it will unite with the fixed in preference to the volatile; and that if previously united with a volatile alkali, it will forsake this for a fixed one.

The doctrine of the affinities of bodies is of a very extensive use in chemical pharmacy: many of the official processes, as we shall see hereafter, are founded on it: several of the preparations turn out very different from what would be expected by a person unacquainted with these properties of bodies; and several of them, if, from an error in the process, or other causes, they prove unfit for the use intended, may be rendered applicable to other purposes, by such transpositions of their component parts as are pointed out by the knowledge of their affinities.

We shall therefore subjoin a table of the principal affinities observed in pharmaceutical operations formed from that of the famous Bergman. See other tables for more general purposes in the article CHEMISTRY.

The table is to be thus understood. The substance printed in capitals, on the top of each series, has the greatest affinity with that immediately under it, a less affinity with the next, and so on to the end of the series: that is, if any of the remote bodies has been combined with the top one, the addition of any of the intermediate bodies will disunite them; the intermediate body uniting with the uppermost body of the series, and throwing out the remote one. Thus, in the first series of the affinities of the vitriolic acid, a fixed alkali being placed between the acid and iron, it is to be concluded, that wherever vitriolic acid and iron are mixed together, the addition of any fixed alkaline salt will unite with the acid, and occasion the iron to be separated. Where several substances are expressed in one series, it is to be understood, that any of those bodies which are nearer to the uppermost, will in like manner disengage from it any of those which are more remote.

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Explan-
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TABLE OF SINGLE ATTRACTIONS.

BY WATER.

VITRIOLIC ACID.	NITROUS ACID.	MARINE ACID.	AQUA REGIA.	ACID OF BORAX.	ACID OF SUGAR.	ACID OF TERRE.	ACID OF SORREL.	ACID OF LEMON.
Terra ponderosa, Vegetable alkali, Fossil alkali, Lime, Magnesia, Volatile alkali, Clay, Zinc, Iron, Lead, Tin, Copper, Antimony, Arsenic, Mercury, Silver, Gold, Water, Alcohol.	Vegetable alkali, Fossil alkali, Terra ponderosa, Lime, Magnesia, Volatile alkali, Clay, Zinc, Iron, Lead, Tin, Copper, Antimony, Arsenic, Mercury, Silver, Gold, Water, Alcohol.	Vegetable alkali, Fossil alkali, Terra ponderosa, Lime, Magnesia, Volatile alkali, Clay, Zinc, Iron, Lead, Tin, Copper, Antimony, Arsenic, Mercury, Silver, Gold, Water, Alcohol.	Vegetable alkali, Fossil alkali, Terra ponderosa, Lime, Magnesia, Volatile alkali, Clay, Zinc, Iron, Lead, Tin, Copper, Antimony, Arsenic, Mercury, Silver, Gold, Water, Alcohol.	Lime, Terra ponderosa, Magnesia, Vegetable alkali, Fossil alkali, Volatile alkali, Clay, Zinc, Iron, Lead, Tin, Copper, Antimony, Arsenic, Mercury, Silver, Gold, Water, Alcohol.	Lime, Terra ponderosa, Magnesia, Vegetable alkali, Fossil alkali, Volatile alkali, Clay, Zinc, Iron, Lead, Tin, Copper, Antimony, Arsenic, Mercury, Silver, Gold, Water, Alcohol.	Lime, Terra ponderosa, Magnesia, Vegetable alkali, Fossil alkali, Volatile alkali, Clay, Zinc, Iron, Lead, Tin, Copper, Antimony, Arsenic, Mercury, Silver, Gold, Water, Alcohol.	Lime, Terra ponderosa, Magnesia, Vegetable alkali, Fossil alkali, Volatile alkali, Clay, Zinc, Iron, Lead, Tin, Copper, Antimony, Arsenic, Mercury, Silver, Gold, Water, Alcohol.	Lime, Terra ponderosa, Magnesia, Vegetable alkali, Fossil alkali, Volatile alkali, Clay, Zinc, Iron, Lead, Tin, Copper, Antimony, Arsenic, Mercury, Silver, Gold, Water, Alcohol.

BY FIRE.

Vegetable alkali, Fossil alkali, Terra ponderosa, Lime, Magnesia, Metals, Volatile alkali, Clay.	Terra ponderosa, Vegetable alkali, Fossil alkali, Lime, Magnesia, Metals, Volatile alkali, Clay.	Terra ponderosa, Vegetable alkali, Fossil alkali, Lime, Magnesia, Metals, Volatile alkali, Clay.	Lime, Terra ponderosa, Magnesia, Vegetable alkali, Fossil alkali, Metals, Volatile alkali, Clay.
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TABLE of SINGLE ATTRACTIONS continued.

By WATER.

ACETOUS ACID.	ACID OF PHOSPHORUS.	AERIAL ACID.	VEGETABLE ALKALI.	FOSSIL ALKALI.	VOLATILE ALKALI.	TERRA PONDEROSA.	LIME.	MAGNESIA.
Terra ponderosa, Vegetable alkali, Fossil alkali, Volatile alkali, Lime, Magnesia, Clay, Zinc, Iron, Lead, Tin, Copper, Antimony, Arsenic, Mercury, Silver, Gold, Water, Alcohol.	Lime, Terra ponderosa, Magnesia, Vegetable alkali, Fossil alkali, Volatile alkali, Clay, Zinc, Iron, Lead, Tin, Copper, Antimony, Arsenic, Mercury, Silver, Gold, Water.	Terra ponderosa, Lime, Vegetable alkali, Fossil alkali, Magnesia, Volatile alkali, Clay, Zinc, Iron, Lead, Tin, Copper, Antimony, Arsenic, Mercury, Silver, Gold, Water.	Vitriolic acid, Nitrous acid, Marine acid, Phosphoric acid, Acid of fugar, Acid of tartar, Acid of forrel, Acid of lemon, Acid of benzoïn, Acetous acid, Acid of borax, Aerial acid, Water, Unctuous oils, Sulphur, Metals.	Vitriolic acid, Nitrous acid, Marine acid, Phosphoric acid, Acid of fugar, Acid of tartar, Acid of forrel, Acid of lemon, Acid of benzoïn, Acetous acid, Acid of borax, Aerial acid, Water, Unctuous oils, Sulphur, Metals.	Vitriolic acid, Nitrous acid, Marine acid, Phosphoric acid, Acid of fugar, Acid of tartar, Acid of forrel, Acid of lemon, Acid of benzoïn, Acetous acid, Acid of borax, Aerial acid, Water, Unctuous oils, Sulphur, Metals.	Vitriolic acid, Acid of fugar, Acid of forrel, Phosphoric acid, Acid of tartar, Nitrous acid, Marine acid, Acid of lemon, Acid of tartar, Acid of benzoïn, Acetous acid, Acid of borax, Aerial acid, Water, Unctuous oil, Sulphur.	Acid of fugar, Acid of forrel, Vitriolic acid, Acid of tartar, Phosphoric acid, Nitrous acid, Marine acid, Acid of lemon, Acid of benzoïn, Acetous acid, Acid of borax, Aerial acid, Water, Unctuous oil, Sulphur.	Acid of fugar, Phosphoric acid, Vitriolic acid, Nitrous acid, Marine acid, Acid of forrel, Acid of tartar, Acid of lemon, Acid of benzoïn, Acetous acid, Acid of borax, Aerial acid, Sulphur.

By FIRE.

Terra ponderosa, Vegetable alkali, Fossil alkali, Lime, Magnesia, Metals, Volatile alkali, Clay.	Lime, Terra ponderosa, Magnesia, Vegetable alkali, Fossil alkali, Metals, Volatile alkali, Clay.		Phosphoric acid, Acid of borax, Vitriolic acid, Nitrous acid, Marine acid, Acetous acid, Terra ponderosa, Lime, Magnesia, Clay, Sulphur.	Phosphoric acid, Acid of borax, Vitriolic acid, Nitrous acid, Marine acid, Acetous acid, Fixed alkali, Sulphur, Lead.	Phosphoric acid, Acid of borax, Vitriolic acid, Nitrous acid, Marine acid, Fixed alkali, Sulphur, Lead.	Phosphoric acid, Acid of borax, Vitriolic acid, Nitrous acid, Marine acid, Fixed alkali, Sulphur, Lead.	Phosphoric acid, Acid of borax, Vitriolic acid, Nitrous acid, Marine acid, Fixed alkali, Sulphur, Lead.	Phosphoric acid, Acid of borax, Vitriolic acid, Nitrous acid, Marine acid, Fixed alkali, Sulphur, Lead.
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TABLE of SINGLE ATTRACTIONS *continued.*

BY WATER.

CLAY.	WATER.	SULPHUR.	HEPAR SULPHURIS.	ALCOHOL.	ÆTHER.	ESSENTIAL OILS.	EXPRESSED OILS.	GOLD.
Vitriolic acid, Nitrous acid, Marine acid, Acid of sugar, Acid of ferret, Acid of tartar, Acid of lemon, Acid of phosphorus, Acid of benzoïn, Acetous acid, Acid of borax, Aerial acid.	Vegetable alkali, Fossil alkali, Volatile alkali, Alcohol, Æther, Vitriolic acid, Vitriolated tartar, Alum, Green Vitriol, Corrosive sublimate.	Lead, Tin, Silver, Mercury, Arsenic, Antimony, Iron, Vegetable alkali, Volatile alkali, Terra ponderosa, Lime, Magnesia, Unctuous oils, Essential oils, Æther, Alcohol.	Gold, Silver, Mercury, Arsenic, Antimony, Copper, Tin, Lead, Iron, Alcohol, Water.	Water, Æther, Essential oils, Volatile alkali, Fixed alkali, Hepar sulphuris, Sulphur.	Alcohol, Essential oils, Expressed oils, Water, Sulphur.	Æther, Alcohol, Expressed oils, Fixed alkali, Sulphur.	Æther, Essential oils, Fixed alkali, Volatile alkali, Sulphur.	Æther, Marine acid, Aqua regia, Nitrous acid, Vitriolic acid, Acid of tartar, Phosphoric acid, Fixed alkali, Volatile alkali.

BY FIRE.

Phosphoric acid, Acid of borax, Vitriolic acid, Nitrous acid, Marine acid, Fixed alkali, Sulphur, Lead.	Fixed alkali, Iron, Copper, Tin, Lead, Silver, Antimony, Mercury, Arsenic.	Iron, Copper, Tin, Lead, Silver, Antimony, Mercury, Arsenic.						Mercury, Copper, Silver, Lead, Tin, Antimony, Iron, Zinc, Arsenic, Hepar sulphuris.
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TABLE of SINGLE ATTRACTIONS continued.

By WATER.

SILVER,	MERCURY.	LEAD.	IRON.	COPPER.	TIN.	ARSENIC.	ZINC.	ANTIMONY.
Marine acid, Acid of sugar, Vitriolic acid, Phosphoric acid, Nitrous acid, Acid of tartar, Acid of lemon, Acetic acid, Acid of borax, Aerial acid. Volatile acid.	Marine acid, Acid of sugar, Phosphoric acid, Vitriolic acid, Acid of tartar, Acid of lemon, Nitrous acid, Acetic acid, Acid of borax, Aerial acid.	Vitriolic acid, Acid of sugar, Acid of tartar, Phosphoric acid, Marine acid, Nitrous acid, Acid of lemon, Acetic acid, Acid of borax, Aerial acid, Fixed alkali.	Acid of sugar, Acid of tartar, Vitriolic acid, Marine acid, Nitrous acid, Phosphoric acid, Acid of tartar, Acid of lemon, Acetic acid, Acid of borax, Aerial acid.	Acid of sugar, Acid of tartar, Marine acid, Vitriolic acid, Nitrous acid, Phosphoric acid, Acid of tartar, Acid of lemon, Acetic acid, Acid of borax, Aerial acid, Fixed alkali, Volatile alkali, Expressed oils.	Acid of tartar, Marine acid, Vitriolic acid, Acid of sugar, Phosphoric acid, Nitrous acid, Acid of tartar, Acid of lemon, Acetic acid, Acid of borax, Fixed alkali, Volatile alkali.	Marine acid, Acid of sugar, Vitriolic acid, Nitrous acid, Acid of tartar, Phosphoric acid, Acid of tartar, Acid of lemon, Acetic acid, Volatile alkali, Unctuous oils.	Acid of sugar, Vitriolic acid, Marine acid, Nitrous acid, Acid of tartar, Acid of tartar, Phosphoric acid, Acid of lemon, Acetic acid, Acid of borax, Aerial acid, Volatile alkali.	Marine acid, Acid of sugar, Vitriolic acid, Nitrous acid, Acid of tartar, Acid of tartar, Phosphoric acid, Phosphoric acid, Acid of lemon, Acetic acid, Acid of borax, Aerial acid, Volatile alkali.

By FIRE.

LEAD,	GOLD,	SILVER,	COPPER,	IRON,	ZINC,	ARSENIC,	ANTIMONY,	MERCURY,	HEPAR SULPHURIS,	SULPHUR.
Lead, Copper, Mercury, Tin, Gold, Antimony, Iron, Zinc, Arsenic, Hepar sulphuris, Sulphur.	Gold, Silver, Copper, Mercury, Tin, Zinc, Copper, Antimony, Arsenic, Iron, Hepar sulphuris, Sulphur.	Gold, Silver, Copper, Mercury, Tin, Zinc, Copper, Antimony, Arsenic, Iron, Hepar sulphuris, Sulphur.	Gold, Silver, Copper, Mercury, Tin, Zinc, Copper, Antimony, Arsenic, Iron, Hepar sulphuris, Sulphur.	Gold, Silver, Copper, Mercury, Tin, Zinc, Copper, Antimony, Arsenic, Iron, Hepar sulphuris, Sulphur.	Gold, Silver, Copper, Mercury, Tin, Zinc, Copper, Antimony, Arsenic, Iron, Hepar sulphuris, Sulphur.	Gold, Silver, Copper, Mercury, Tin, Zinc, Copper, Antimony, Arsenic, Iron, Hepar sulphuris, Sulphur.	Gold, Silver, Copper, Mercury, Tin, Zinc, Copper, Antimony, Arsenic, Iron, Hepar sulphuris, Sulphur.	Gold, Silver, Copper, Mercury, Tin, Zinc, Copper, Antimony, Arsenic, Iron, Hepar sulphuris, Sulphur.	Gold, Silver, Copper, Mercury, Tin, Zinc, Copper, Antimony, Arsenic, Iron, Hepar sulphuris, Sulphur.	Gold, Silver, Copper, Mercury, Tin, Zinc, Copper, Antimony, Arsenic, Iron, Hepar sulphuris, Sulphur.

By WATER.

1. Epfom falt with Mild vegetable alkali,	Give	1. Vitriolated tartar and Common magnesia.
2. Vitriolic ammoniac with Mild mineral alkali,		2. Glauber's falt and Mild volatile alkali.
3. Vitriolated tartar with Nitrous felenite,		3. Vitriolic felenite and Saltpetre.
4. Vitriolated tartar with Mercurial nitre,		4. Vitriol of mercury and Saltpetre.
5. Saltpetre with Luna cornea,		5. Lunar caustic and Cubic nitre.
6. Vitriolated tartar with Luna cornea,		6. Vitriol of silver and Febrifugal falt.
7. Regenerated tartar with Mercurial nitre,		7. Acetous mercurial falt and Saltpetre.

By HEAT.

1. Vitriolic ammoniac with Common falt,	Give	1. Common fal ammoniac and Glauber's falt.
2. Vitriolic ammoniac with Regenerated tartar,		2. Acetous ammoniacal falt and Vitriolated tartar.
3. Vitriol of mercury with Common falt,		3. Glauber's falt and Corrosive fublimite.
4. Crude antimony with Corrosive fublimite,		4. Butter of antimony and Fictitious cinnabar.

CHAP. II. Of the Pharmaceutical Apparatus.

57 The application of fire of great importance in pharmaceutical preparations.

ONE of the principal parts of the pharmaceutical apparatus consists in contrivances for containing and applying fire, and for directing and regulating its power. Of these contrivances called *furnaces*, there are different kinds, according to the conveniency of the place, and the particular purposes they are intended to answer. We shall here endeavour to give a general idea of their structure, and of the principles on which they are built; and for particulars refer the reader to FURNACE; and CHEMISTRY, page 450.

The most simple furnace is the common stove, otherwise called the *furnace for open fire*. This is usually made of an iron hoop, five or six inches deep; with a grate or some iron bars across the bottom, for supporting the fuel. It either stands upon feet, so as to be moveable from place to place; or is fixed in brick-work. In this last case, a cavity is left under the grate, for receiving the ashes that drop through it; and an aperture or door, in the forepart of this ash-pit, serves both for allowing the ashes to be occasionally raked out, and for admitting air to pass up through the fuel. This furnace is designed for such operations as require only a moderate heat; as infusion, decoction, and the evaporation of liquids.

A deeper hoop or body, cylindrical, parallel-pipedal, widening upwards, elliptical, or of other figures; formed of, or lined with, such materials as are capable of sustaining a strong fire; with a grate and ash-pit beneath, as in the preceding; and communicating at the top with a perpendicular pipe, or chimney; makes a *wind furnace*.

The greater the perpendicular height of the chimney, the greater will be the draught of air through the furnace, and the more intensely will the fire burn; provided the width of the chimney is sufficient to allow a free passage to all the air that the furnace can receive through the grate; for which purpose, the area of the aperture of the chimney should be nearly equal to the area of the interstices of the grate.

Hence, where the chimney consists of moveable pipes, made to fit upon each other at the ends, so that the length can be occasionally increased or diminished, the vehemence of the fire will be increased or diminished in the same proportion.

In furnaces whose chimney is fixed, the same advantage may be procured on another principle. As the intensity of the fire depends wholly upon the quantity of air successively passing through and animating the burning fuel, it is obvious, that the most vehement fire may be suppressed or restrained at pleasure, by closing more or less either the ash-pit door by which the air is admitted, or the chimney by which it passes off; and that the fire may be more or less raised again, by more or less opening those passages. A moveable plate, or register, in any convenient part of the chimney, affords commodious means of varying the width of the passage, and consequently of regulating the heat. This is most conveniently accomplished by keeping the ash-pit door entirely shut, and regulating the heat by a range of holes in a damping plate; each hole is provided with a proper pin, whereby we may shut it at pleasure. These holes may be made to bear a certain proportion to each other; the smallest being considered as one, the next to it in size must have twice the opening, the next to that double of the second, &c.; and so on to the number of seven or eight; and by combining these holes variously together, we can admit any quantity of air from 1 to 128; as 1. 2. 4. 8. 16. 32. 64. 128. See FURNACE, p. 507.

There are two general kinds of these wind-furnaces; one, with the chimney on the top, over the middle of the furnace; the other with the chimney on one side, and the mouth clear.

In the first, either the upper part of the furnace is contracted to such an aperture, that the chimney may sit upon it; or it is covered with an arched dome, or with a flat plate, having a like aperture in the middle. As in this disposition of the chimney, the inside of the furnace cannot be come at from above, a door is made in the side, a little above the grate, for supplying the fuel, inspecting the matter in the fire, &c.

For performing fusions in this furnace, the crucible, or melting vessel, is placed immediately among the fuel, with a slip of brick, or some other like support, between it and the grate, to keep the cold air, which enters underneath, from striking on its bottom.

When designed as a reverberatory, that is for distillation in long-necked coated glass retorts, two iron bars are placed across, above the fire, for supporting the vessel, whose neck comes out at an aperture made for that purpose in the side. This aperture should be made in the side opposite to the door above-mentioned; or at least so remote from it, that the receiver, fitted on the neck of the distilling vessel without the furnace, may not lie in the operator's way when he wants to stir the fire or throw in fresh fuel.

The other kind of wind-furnace communicates, by an aperture in its back part near the top, either with an upright pipe of its own, or with the chimney of the room; in which last case, all other passages into the chimney must be closed. Here the mouth of the furnace serves for a door, which may be occasionally covered with a plate or tile. Of this kind is the furnace most commonly used for fusion in a crucible.

This last construction, by leaving the mouth of the furnace clear, affords the convenience of letting into it a boiling or evaporating pan, a copper still, an iron pot, for distilling hartshorn, an iron sand-pot, or other like vessels, of such a size that they may be supported on the furnace by their rims. The mouth being thus occupied by the vessels, a door must be made in the side for supplying and stirring the fuel.

When a furnace of this kind is designed only for a sand-bath, it is most commodious to have the sand placed on a long iron plate, furnished with a ledge of freestone or brick work at each side. The mouth of the furnace is to be closely covered by one end of this plate; and the canal by which the furnace communicates with its chimney, is to be lengthened and carried along under the plate, the plate forming the upper side of the canal. In this kind of sand-bath, digestions, &c. requiring different degrees of heat, may be carried on at once; for the heat decreases gradually from the end over the furnace to the other.

When large vessels, as stills and iron pots for distilling hartshorn and aquafortis, are fixed in furnaces, a considerable part of the bottom of the vessel is commonly made to rest upon solid brick-work.

The large still, whose bottom is narrow in proportion to its height, and whose weight, when charged with liquor, requires great part of it to be thus supported, exposes but a small surface to the action of the fire underneath. To make up for this disadvantage, the heat, which rises at the further end of a long narrow grate, is conveyed all round the sides of the vessel by a spiral canal, which communicates at top with a common chimney.

The pots for distilling hartshorn and aquafortis in

the larger way, have part of their great weight borne up by three strong pins or trunions at equal distances round the pot towards the middle reaching into a brick-work: so that less support being necessary underneath, a greater surface of the wide bottom lies exposed to the immediate action of the fire.

If a furnace, communicating with its chimney by a lateral canal, as in the sand-furnace above-mentioned, be carried to a considerable height above the part where this canal enters it, and if it be filled with fuel to the top, and closely covered, the fuel will burn no higher than up to the upper side of the canal through which the air passes off; and in proportion as this lower part of the fuel consumes, it will be supplied by that above, which falls down in its place. Hence in this furnace, called an *athanor*, a constant heat may be kept up for a considerable length of time without attendance.

The tower of the *athanor*, or that part which receives the fuel, is commonly made to widen a little downwards, that the coals may fall the more freely. but not so much as that the part on fire at bottom may be too strongly pressed. A small aperture is made opposite to the canal or flue, or a number of openings according to the size of the furnace and the degree of heat required, for supplying the air, which is more conveniently admitted in this manner than through the grate, as the interstices of the grate are in time choked up by the ashes.

This furnace is designed only for heating bodies exterior to it. Its canal or flue, as in the sand-furnace already described, passes under a sand-bath or water-bath; at the farther end of which it rises perpendicularly to such a height, as may occasion a sufficient draught of air through the fire.

The flue may be so wide as to correspond to the whole height of the fire-place. A register or sliding plate, placed between the flue and the furnace, enables us to increase or diminish this height, and consequently the quantity of fire, at pleasure. If the space beneath the flue be inclosed to the ground, the heat in this cavity will be considerable enough to be applicable to some useful purposes.

With regard to the materials of furnaces, the fixed ones are built of bricks, cemented together by some good loam or clay. Any kind of loam or clayey composition that is of a proper degree of tenacity, which, when made into a paste with water and well-worked, does not stick to the fingers, and which, when thoroughly dried, neither cracks nor melts in a vehement fire, is fit for use. The purer and more tenacious clays require to have their tenacity lessened by an admixture of sand, or rather of the same kind of clay burnt and grossly powdered.

Smaller portable furnaces are made of strong iron or copper plates, lined, to the thickness of an inch or more, with the same kind of clayey composition; which for this use may be beaten with some horse-dung, chopped straw, or cut hair or tow.

Very commodious portable furnaces, for a business of moderate extent, may be formed of the larger kind of common black-lead melting-pots, by cutting a door at the bottom of the pot for the ash-pit, another above this for the fire-place, and introducing a circular iron grate of such a size as may rest between the two doors.

For

63
Of the materials of which furnaces are made.

Licenses. For a more particular account of the method of preparing furnaces, see FURNACE.

BATHS.

64
Of two
kinds of
baths, and
the nature
of each.

Where a strong degree of heat is requisite, as in the fusion of metals, &c. the vessel containing the subject matter is placed among the burning fuel, or immediately over it: it is called *operating in a naked fire*. Where a lesser heat is sufficient, and the vessel employed is either of glass, or of the more tender kinds of earthen ware, the sand bath or water bath is used to defend the vessel from the immediate action of the fire, and to render the heat less fluctuating.

Both these baths have their peculiar advantages and inconveniences. In water, the heat is equal through every part of the fluid: whereas in sand it varies in different parts of one perpendicular line, decreasing from the bottom to the top. Water cannot be made to receive, or to transmit to vessels immersed in it, above a certain degree of heat, viz. that which is sufficient to make it boil; and hence it secures effectually against any danger of an excess of heat in those operations wherein the product would be injured by a heat greater than that of boiling water: but this advantage renders it useless for processes which require a greater heat, and for which sand or other solid intermedia are necessarily employed. There is this convenience also in the sand-bath, that the heat may be readily diminished or increased about any particular vessel, by raising it higher out of the sand or sinking it deeper; that different subjects may be exposed to different degrees of heat from one fire; and that it keeps the vessels steady. The sand made choice of should be a large coarse grained kind, separated from the finer parts by washing, and from little stones by the sieve.

COATING OF GLASSES, LUTES.

65
In some operations
glass vessels
are used in
a naked fire.

Some processes require to be performed with glass vessels in a naked fire. For these purposes, vessels made of the thinnest glass should be chosen; for these bear the fire without cracking, much better than those which are thicker, and in appearance stronger.

All glasses, or other vessels that are apt to crack in the fire, must be cautiously nealed, that is, heated by slow degrees: and when the process is finished, they should be as slowly cooled, unless where the vessel is to be broken to get out the preparation, as in some sublimations: in this case it is more advisable to expose the hot glass suddenly to the cold air, which will soon occasion it to crack, than to endanger throwing down the sublimated matter among the feces by a blow.

66
Of the coat-
ing of glass
vessels.

As a defence from the violence of the fire, and to prevent the contact of cold air on supplying fresh fuel, &c. the glass is to be coated over, to the thickness of about half-a-crown, with Windsor loam, softened with water into a proper consistence, and beaten up with some horse-dung, or with the other clayey compositions above mentioned.

These compositions serve also as a lute, for securing the junctures of the vessels in the distillation of the volatile salts and spirits of animals: for the distillation of acid spirits, the matter may be moistened with a solution of fixed alkaline salt instead of water. For most other purposes, a piece of wet bladder, or paste of

flour and water, or of linseed meal (that is, the cake left after the expression of oil of linseed), are sufficient lutes.

Sometimes clay and chalk are mixed up into a paste, and spread upon slips of paper; and sometimes gum-arabic is used instead of the clay, and mixed up in the same manner.

Wet bladders contract so strongly by drying, that they not unfrequently break the vessels: and the fat lute of Mr Macquer, which is a composition of clay and chalk with oil, is too close for most operations. Where very elastic steams are to be condensed, we are often obliged, even where the common lutes are employed, to leave or make an opening which may be occasionally stopped by a plug: by this means we give passage to a part of these vapours, which prevents the bursting of the vessels and facilitates the condensation of the rest. If we wish to collect incondensable vapours, we receive them into a jar inverted under a basin of water, or quicksilver, as is usually done in the analysis of vegetables by fire.

Besides these, there are also required some other kinds of lutes for joining vessels together in operations requiring a strong heat, and for lining furnaces; for which see CHEMISTRY, n° 674, 605.

VESSELS.

In this place, we shall only give the operator a few general cautions with regard to the matter of the vessels designed for containing the subject; and refer their description, to the account of the operations in which they are employed. See likewise CHEMISTRY, n° 357, &c.

Metalline vessels possess the advantage of being able to bear sudden alterations of heat and cold, and of being very strong, so as to be capable of confining elastic steams; but, except those made of gold or silver, they are readily corroded by acids, even by the mild ones of the vegetable kingdom. Copper vessels are corroded also by alkaline liquors, and by some neutral ones, as solutions of sal ammoniac. It is observable, that vegetable acids do not act upon this metal by boiling, so much as by standing in the cold; for even lemon juice may be boiled in a clean copper vessel, without receiving from it any taste or ill quality; whereas, in the cold, it soon dissolves so much as to contract a pernicious taint. The tin, with which copper vessels are usually lined, gives likewise a sensible impregnation to acid juices; and this impregnation also is probably not innocent, more especially as a quantity of lead is commonly mixed with the tin. From the want of transparency in these vessels, we are also deprived of the advantage of seeing the different changes during the operation.

The earthen vessels possess none of the desirable qualities for chemical operations, except that of sustaining very violent degrees of heat, without being melted or otherwise changed. These vessels are less liable to external cracks from sudden applications of heat and cold, when they are made with a certain proportion of sand, than with pure clay. Black lead, too, mixed with the clay, makes the vessels sustain violent degrees and sudden alterations of heat surprisingly well: crude clay, reduced to a kind of sand by violent heat, and then mixed with new clay, is also found to furnish vessels excellently fitted for those operations where

where sand might be corrodell: but of all kinds of earthen ware, the most perfect is porcelain, composed of the finest clay mixed with a stony matter capable of melting in a violent heat. This, however, is too costly an article for general use. Reaumur discovered a method of imitating porcelain, by melting the coarser kinds of glass with a mixture of sand and clay: this has been found to be nearly of the colour of porcelain, to be much stronger than glass, and to bear the most sudden changes of heat and cold that we have occasion to apply. There has not hitherto been any manufacture of this ware, and of course it has not come into general use.

The common earthen vessels are of a loose porous texture; and hence are apt to imbibe a considerable quantity of certain liquids, particularly of those of the saline kind; which soon discover that they have penetrated the vessel, by shooting into saline efflorescences on the outside. Those which are *glazed* have their glazing corroded by acids: by vinegar, and the acid juices of fruits, as well as by the stronger acids of the mineral kingdom. And as this glazing consists chiefly of vitrified lead, the impregnation which it communicates to these liquors is of a very dangerous kind. If vinegar be boiled for some time in a glazed earthen vessel, it will yield, on being inspissated, a pure fal plumbi, that is, a salt composed of lead and the acetic acid.

The vessels called, from their hardness and compactness, *stone ware*, are in a good measure free from the inconveniences of the coarser earthen ones. Their glazing being a part of the clay itself, superficially vitrified by means of the fumes of common salt, appears to be proof against acids.

Glass vessels suffer no corrosion, and give no taint, in any of the pharmaceutic operations. When, therefore, they are made of a proper thinness, when they are well annealed, and when blown into a spherical form so that the heat may be equally applied, they are preferable to all others, where great and sudden changes of heat and cold are not to take place, and where strength is not required: what is called the *flint glass*, which contains a quantity of lead in its composition, is the best for chemical purposes.

WEIGHTS.

Two different kinds of weights are made use of in this country; one in the merchandise of gold and silver; the other for almost all other goods. The first we call Troy, the latter Avoirdupois weight.

The goldsmiths divide the Troy pound into twelve ounces; the ounce into 20 pennyweights; and the pennyweight into 24 grains. The Avoirdupois pound is divided into 16 ounces; and the ounce into 16 parts, called *drams*.

The pound of the London and Edinburgh dispensaries is that of the goldsmiths, divided in the following manner:

The pound	} contains	twelve ounces.
The ounce		eight drams.
The dram		three scruples.
The scruple		twenty grains.
The grain is equal to the goldsmith's grain.		

The medical or Troy pound is less than the Avoirdupois, but the ounce and the dram greater. The Troy pound contains 5760 grains: the Avoirdupois 7000 grains. The Troy ounce contains 480 grains; the Avoirdupois only 437½. The Troy dram 60; the Avoirdupois dram somewhat more than 27. Eleven drams Avoirdupois are nearly equal to five drams Troy; 12 ounces Avoirdupois to nearly 11 ounces Troy; and 19 pounds Avoirdupois are equal to somewhat more than 23 pounds Troy.

These differences in our weights have occasioned great confusion in the practice of pharmacy. As the druggists and grocers sell by the Avoirdupois weight, the apothecaries have not in general kept any weights adjusted to the Troy pound greater than two drams, using Avoirdupois ounces. By this means it is apparent, that in all compositions, where the ingredients are prescribed, some by pounds and others by ounces, they are taken in a wrong proportion to each other; and the same happens where any are directed in lesser denominations than the ounce, as these subdivisions used by the apothecaries are made to a different ounce.

MEASURES.

The measures employed in pharmacy are the common wine measures.

A gallon	} contains	eight pints (<i>libra</i> .)
The pint		sixteen ounces.
The ounce		eight drams.

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The measures used in pharmacy the same with those commonly used for wine.

Though the pint is called by Latin writers *libra* or pound, there is not any known liquor of which a pint measure answers to that weight. A pint of the highest rectified spirit of wine exceeds a pound by above half an ounce; a pint of water exceeds it by upwards of three ounces; and a pint of oil of vitriol weighs more than two pounds and a quarter.

The Edinburgh College, sensible of the many errors from the promiscuous use of weights and measures, and of their different kinds, have in the last edition of their Pharmacopœia entirely rejected measures, and employ the Troy weight in directing the quantity either of solid or fluid substances. They have, however, taken all possible care that the proportion of the simples and strength of the compounds should neither be increased nor diminished by this alteration. This change in the Edinburgh Pharmacopœia must be very particularly adverted to. And it is, we think, to be regretted, that the London College have not in the last edition of their Pharmacopœia followed the same plan.

A table of the weights of certain measures of different fluids may on many occasions be useful, both for assisting the operator in regulating their proportions in certain cases, and showing the comparative gravities of the fluids themselves. We here insert such a table for a pint, an ounce, and a dram measure, of those liquids whose gravity has been determined by experiments that can be relied on. The wine gallon contains 231 cubic inches; whence the pint contains 28½, the ounce 1½, and the dram ¾ of a cubic inch.

70
A table of the weights of certain measures of various fluids may frequently be useful.

SECT. I. SOLUTION.

SOLUTION is an intimate commixture of solid bodies The with fluids into one seemingly homogeneous liquor. of s both hum dry
The dissolving fluid is called a *menstruum* or *solvent*; and the body dissolved is called the *solvend*.

Objections have been made, and perhaps with propriety, to these terms; as it is supposed that the two bodies uniting in solution act reciprocally on each other: there is, however, no danger from the words themselves, if we do not derive them from a mistaken theory. Solution cannot take place, unless one of the bodies, at least, be in a fluid state; and this fluidity is effected either by water or fire: hence solution is said to be performed in the *humid* or in the *dry way*. Thus, for instance, if any quantity of brimstone be dissolved in a solution of fixed alkali, the brimstone is said to be dissolved in the *humid way*: but if the brimstone be dissolved by melting it in a pan with the dry alkali, the solution is said to be done in the *dry way*. The *hepar sulphuris* is the same in both. Another kind of solution resembling that by the dry way, is, however, to be carefully distinguished from it: if, for example, a piece of Glauber's salt is put into a pan over the fire, the salt very soon assumes a liquid state; but on continuing the heat, it loses its fluidity, and becomes a white powder: this powder is the salt freed from its water, and it is found to be very refractory. This liquidity depended on the water of crystallization being enabled by the heat to keep the salt in solution, and the salt ceased to be fluid as soon as its crystallizing water was evaporated. This kind of solution, then, differs not from the first, or humid way.

If one of the two bodies to be united is transparent, the solution, if complete, is a transparent compound: this is the case in solutions of alkalis and calcareous earths in acids. But if the solution be opaque and milky, as is the case with soap and water, it is then considered as incomplete.

The principal menstrua used in pharmacy are, *water, vinous spirits, oils, acid and alkaline liquors*.

Water is the menstruum of all salts, of vegetable gums, and of animal gellies. Of salts, it dissolves only a determinate quantity, though of one kind of salt more than another; and being thus *saturated*, leaves any additional quantity of the same salt untouched.

Experiments have been made for determining the quantities of water which different salts require for the dissolution. Mr Eller has given a large set in the Memoirs of the Royal Academy of Sciences of Berlin for the year 1750, from which the following table is extracted.

Eight ounces by weight of distilled water dissolved.

	oz.	dr.	gr.
Of refined sugar	24	0	0
Green vitriol	9	4	0
Blue vitriol	9	0	0
White vitriol	4	4	0
Epsum salt	4	0	0
Purified nitre	4	0	0
Soluble tartar	4	0	0
Common salt	3	4	0
Sal gemmæ	3	4	0

Sal

INFLAMMABLE SPIRITS.
 Æthereal spirit of wine
 Highly-rectified spirit of wine
 Common-rectified spirit of wine
 Proof spirit
 Dulcified spirit of salt
 Dulcified spirit of nitre

WINES.
 Burgundy - -
 Red port - -
 Canary - -

EXPRESSED OILS.
 Oil olive - -
 Linseed oil - -

ESSENTIAL OILS.
 Oil of turpentine -
 of orange-peel -
 of juniper-berries
 of rosemary -
 of origanum
 of caraway seeds -
 of nutmegs -
 of favin -
 of hyssop -
 of cummin-seed
 of mint
 of pennyroyal -
 of dill-seed -
 of fennel-seed -
 of cloves -
 of cinnamon -
 of saffrafas -

ALKALINE LIQUORS.
 Aqua kali puri, *Pharm. Lond.*
 Spirit of sal ammoniac
 Strong soap boilers ley
 Lixivium tartari -

ACID LIQUORS.
 Wine-vinegar -
 Beer-vinegar -
 Glauber's spirit of salt
 Glauber's spirit of nitre
 Strong oil of vitriol -

ANIMAL FLUIDS.
 Urine - -
 Cows milk - -
 Asses milk - -
 Blood - -

WATERS.
 Distilled water -
 Rain-water - -
 Spring-water - -
 Sea-water - -

QUICKSILVER.

Pint weights	Ounce measure weights	Dram measure weights
ounces	drams	grains
11 1 36	336	42
12 5 20	380	47½
13 2 40	400	50
14 1 36	426	53½
14 4 48	438	55½
15 2 40	460	57½
14 1 36	426	53½
15 1 36	456	57
15 6 40	475	59½
14 0 0	420	52½
14 2 8	428	53½
12 1 4	364	45½
	408	51
	419	52½
	430	53½
	432	54
	432	54
	436	54½
	443	55½
	448	56
	448	56
	450	56½
	457	57½
	458	57½
	476	59½
	576	49½
	503	62½
16 0 0	480	60
17 1 10	514½	64½
17 6 24	534	66½
24 0 0	720	90
15 3 44	464	58
15 6 56	476	59½
17 4 0	525	65½
20 2 40	610	76½
28 5 20	860	107½
15 5 20	470	58½
15 6 40	475	59½
16 0 0	480	60
16 1 4	484	60½
15 1 50	456½	57
15 2 40	460	57½
15 3 12	462	57½
15 5 20	470	58½
214 5 20	6440	805

Sal catharticus Glauberi	3	4	0
Seignette's salt	3	0	0
Alum	2	4	0
Sal ammoniac	2	4	0
Vitriolated tartar	1	4	0
Salt of hartshorn	1	4	0
Sugar of lead	1	2	0
Cream of tartar	1	0	0
Borax	0	4	20

Sugar-candy, both brown and white	9	0	0
Sugar of milk	0	2	40
Essential salt of sorrel	0	1	20

Though great care appears to have been taken in making these experiments, it is not to be expected that the proportions of the several salts, soluble in a certain quantity of water, will always be found exactly the same with those above set down. Salts differ in their solubility according to the degree of their purity, perfection, and dryness: the vitriols, and the artificial compound salts in general, differ remarkably in this respect, according as they are more or less impregnated with the acid ingredient. Thus vitriolated tartar; perfectly neutralized, is extremely difficult of solution: the matter which remains in making Glauber's spirit of nitre is no other than a vitriolated tartar; and it dissolves so difficultly, that the operator is obliged to break the retort in order to get it out; but on adding more of the vitriolic acid, it dissolves with ease. Hence many have been tempted to use an over-proportion of acid in this preparation: and we frequently find in the shops, under the name of vitriolated tartar, this acid soluble salt. The degree of heat occasions also a remarkable difference in the quantity of salt taken up: in very cold weather, 8 ounces of water will dissolve only about one ounce of nitre; whereas in warm weather, the same quantity will take up three ounces or more. To these circumstances are probably owing, in part, the remarkable differences in the proportionable solubilities of salts, as determined by different authors. It is observable that common salt is less affected in its solubility by a variation of heat than any other; water in a temperate state dissolving nearly as much of it as very hot water: and accordingly this is the salt in which the different experiments agree the best. In the experiments of Hoffmann, Neumann, and Petit, the proportion of this salt, on a reduction of the numbers, comes on exactly the same, viz. three ounces of the salt to eight of water; Dr Brownrigg makes the quantity of salt a little more; Dr Grew, a dram and a scruple more; and Eller, as appears in the above table, four drams more: so that in the trials of six different persons, made probably in different circumstances, the greatest difference is only one sixth of the whole quantity of salt; whereas in some other salts there are differences of twice or thrice the quantity of the salt. In the experiments from which the table is drawn, the water was of the temperature of between 40 and 42 degrees of Fahrenheit's thermometer, or above freezing by about one-seventh of the interval between freezing and the human heat.

Some salts omitted by Eller are here subjoined; the first is taken from Dr Grew, and the other four from Neumann.

Eight ounces of water dissolved,

	oz.	dr.	gr.
Of fixed alkaline salt	above 8	0	0
Sal diureticus	8	0	0

Though water takes up only a certain quantity of one kind of salt, yet when saturated with one, it will still dissolve some portion of another; and when it can bear no more of either of these, it will still take up a third, without letting go any of the former. The principal experiments of this kind which have been made relative to pharmaceutic subjects, are exhibited in the following table; of which the two first articles are from Grew, and the others from Eller.

Water, 32 parts by weight,			
Fully saturated with		dissolved afterwards	
Nitre	Sal ammoniac	10	
Common salt	Nitre	10	Sal ammoniac 2
Nitre	Fixed alkali	7	Common salt 2
Common salt	Nitre, near	2	Fixed alkali 2½
Volatile alkali	Nitre	4	Sugar 2
Sal ammoniac	Common salt	2½	
Soluble tartar	Nitre	2	
Vitriolated tartar	Fixed alkali	2	
Glauber's salt	Nitre	1	Sugar 1
Epom salt	Sugar	6	
Borax	Fixed alkali	2	

In regard to the other class of bodies for which water is a menstruum, viz. those of the gummy gelatinous kind, there is no determinate point of saturation: the water unites readily with any proportions of them, forming with different quantities liquors of different consistence. This fluid takes up likewise, when assisted by trituration, the vegetable gummy resins, as ammoniac and myrrh; the solutions of which, though imperfect, that is, not transparent, but turbid and of a milky hue, are nevertheless applicable to valuable purposes in medicine. It mingles with vinous spirits, with acid and alkaline liquors, not with oils, but imbibes some of the more subtil parts of essential oils, so as to become impregnated with their smell and taste.

Rectified spirit of wine, or rather alcohol, is the menstruum of the essential oils and resins of vegetables; of the pure distilled oils, and several of the colouring and medicinal parts of animals; of some mineral bituminous substances, as of ambergris; and of soaps, though it does not act upon the expressed oil and fixed alkaline salt, of which soap is composed: whence, if soap contains any superfluous quantity of either the oil or salt, it may by means of this menstruum be excellently purified. It dissolves, by the assistance of heat, volatile alkaline salts; and more readily the neutral ones, composed either of fixed alkali and the acetous acid, as the sal diureticus, or of the volatile alkali and the nitrous acid, as also the salt of amber, &c. It mingles with water and with acids; not with alkaline lixivia.

Oils dissolve vegetable resins and balsams, wax, animal-fats, mineral bitumens, sulphur, and certain metallic substances, particularly lead. The expressed oils are, for most of these bodies, more powerful menstrua than those obtained by distillation; as the former are more capable of sustaining, without injury, a strong heat, which is in most cases necessary to enable them to act. It is said, that one ounce of sulphur will dissolve in three ounces of expressed oil, particularly lin-

Elements. seed oil ; but requires six ounces of essential oil, as turpentine.

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All acids dissolve alkaline salts, alkaline earths and metallic substances.

All acids dissolve alkaline salts, alkaline earths, and metallic substances. The different acids differ greatly in their action upon these last ; one dissolving only some particular metals ; and another, others.

The *vegetable* acids dissolve a considerable quantity of zinc, iron, copper, lead, and tin ; and extract so much from the metallic part of antimony, as to become powerfully emetic : they dissolve lead more readily, if the metal be previously calcined by fire, than in its metallic state.

The *marine* acid dissolves zinc, iron, and copper ; and though it scarcely acts on any other metallic substance in the common way of making solutions, it may nevertheless be artfully combined with them all except gold. The corrosive sublimate, and antimonial caustic of the shops, are combinations of it with mercury and the metallic part of antimony, effected by applying the acid, in the form of fume, to the subjects, at the same time also strongly heated.

The *nitrous* acid is the common menstruum of all metallic substances, except gold and the metallic part of antimony ; of which two, the proper solvent is a mixture of the nitrous and marine acids, called *aqua regia*.

The *vitriolic* acid, diluted with water, easily dissolves zinc and iron. In its concentrated state, and assisted by a boiling heat, it may be made to corrode, or imperfectly dissolve, most of the other metals.

The aerial acid dissolves iron, zinc, and calcareous earth ; and those solutions must be conducted without heat.

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Alkaline lixivia dissolve oils, resinous substances, and sulphur.

Alkaline *lixivia* dissolve oils, resinous substances, and sulphur. Their power is greatly promoted by the addition of quicklime ; instances of which occur in the preparation of soap, and in the common caustic. Thus acuated, they reduce the flesh, bones, and other solid parts of animals, into a gelatinous matter. This increased acrimony in alkaline salts is owing to the abstraction of their fixed air ; that acid having a greater attraction for quicklime than for alkalis.

Solutions made in water and in spirit of wine possess the virtues of the body dissolved ; while oils generally sheath its activity, and acids and alkalis vary its quality. Hence watery and spirituous liquors are the proper menstrua of the native virtues of vegetable and animal matters.

Most of the foregoing solutions are easily effected, by pouring the menstruum on the body to be dissolved, and suffering them to stand together for some time exposed to a suitable warmth. A strong heat is generally requisite to enable oils and alkaline liquors to perform their office ; nor will acids act on some metallic bodies without its assistance. The action of watery and spirituous menstrua is likewise expedited by a moderate heat ; though the quantity which they afterwards keep dissolved is not, as some suppose, by this means increased : all that heat occasions these to take up, more than they would do in a longer time in the cold, will, when the heat ceases, subside again. This at least is most commonly the case, though there may be some instances of the contrary.

The action of acids on the bodies which they dissolve, is generally accompanied with heat, effervescence,

and a copious discharge of fumes. The fumes which arise during the solution of some metals in the vitriolic acid, prove inflammable : hence in the preparation of the artificial vitriols of iron and zinc, the operator ought to be careful, especially where the solution is made in a narrow mouthed vessel, lest by the imprudent approach of a candle the exhaling vapour be set on fire. This vapour is the inflammable air of Dr Priestley and other modern chemists.

There is another species of solution, in which the moisture of the air is the menstruum. Fixed alkaline salts, and those of the neutral kind, composed of alkaline salts and the vegetable acids, or of soluble earths and any acid, except the vitriolic, and some metallic salts, on being exposed for some time to a moist air, gradually attract its humidity, and at length become liquid. Some substances, not dissoluble by the application of water in its grosser form, as the butter of antimony, are easily liquefied by this slow action of the aerial moisture. This process is called *dilatation*.

SECT. II. EXTRACTION.

THE liquors which dissolve certain substances in their pure state, serve likewise to *extract* them from admixtures of other matter. Thus ardent spirit, the menstruum of essential oils and resins, takes up the virtues of the resinous and oily vegetables, as water does those of the mucilaginous and saline ; the inactive earthy parts remaining untouched by both. Water extracts likewise from many plants, substances which by themselves it has little effect upon ; even essential oils being, as we have formerly observed, rendered soluble in that fluid by the admixture of gummy and saline matter, of which all vegetables participate in a greater or less degree. Thus many of the aromatic plants, and most of the bitters and astringents, yield their virtues to this menstruum.

Extraction is performed, by *macerating* or *sleeping* the subject in its appropriated menstruum in the cold ; or *digesting* or *circulating* them in a moderate warmth ; or *infusing* the plant in the boiling liquor, and suffering them to stand in a covered vessel till grown cold ; or actually *boiling* them together for some time. If the vegetable matter is itself succulent and watery, it is sometimes only necessary to express the juice, and evaporate it to the proper consistence.

The term *digestion* is sometimes used for maceration ; and in this case the process is directed to be performed *without heat* : where this circumstance is not expressed, digestion always implies the use of heat. Circulation differs from digestion only in this, that the steam, into which a part of the liquor is resolved by the heat, is, by means of a proper disposition of the vessels, condensed and conveyed back again upon the subject. Digestion is usually performed in a matras (or bolt-head), Florence flask, or the like ; either of which may be converted into a circulatory vessel, by inverting another into the mouth, and securing the juncture with a piece of wet bladder. A single matras, if its neck be very long and narrow, will answer the purpose as effectually ; the vapour cooling and condensing before it can rise to the top : in a vessel of this kind, even spirit of wine, one of the most volatile liquors we know, may be boiled without any considerable loss : the use of this instr-

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Those liquors which dissolve substances are also useful for extracting them from admixtures of other matter.

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Method of performing extractions.

ements. instrument is likewise free from an inconvenience which may in some cases attend the other, of the uppermost vessel being burst or thrown off. As the long necked matrasses here recommended are difficultly filled or emptied, and likewise very dear, a long glass pipe may be occasionally luted to the shorter ones.

Heat greatly expedites extraction; but by this means proves as injurious to some substances, by occasioning the menstruum to take up their grosser and more ungrateful parts, as it is necessary for enabling it to extract the virtues of others. Thus guaiacum and logwood impart little to aqueous liquors without a boiling heat; whilst even a small degree of warmth proves greatly prejudicial to the fine bitter of carduus benedictus. This plant, which infused in boiling, or digested in sensibly hot water, gives out a nauseous taste, so offensive to the stomach as to promote vomiting, yields to the cold element a grateful balsamic bitter.

As heat promotes the dissolving power of liquids; so cold, on the other hand, diminishes it. Hence tinctures or extractions made by a considerable heat, depose in cold weather a part of their contents, and thus become proportionally weaker: a circumstance which deserves particular regard.

SECT. III. DEPURATION.

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THERE are different methods of depurating or purifying liquors from their feculencies, according as the liquor itself is more or less tenacious, or the feculent matter of greater or less gravity.

Thin fluids readily depose their more ponderous impurities upon standing at rest for some time in a cool place; and may then be decanted or poured off clear, by inclining the vessel.

Glutinous, or thick substances, are to be liquefied by a suitable heat; when the grosser feculencies will fall to the bottom, the lighter arising to the surface to be despumated or skimmed off.

Where the impurities are neither so ponderous as to subside freely to the bottom, nor so light as to arise readily to the surface, they may be separated in great measure by *colature* through strainers of linen, woollen, or other cloth; and more perfectly by *filtration* through a soft bibulous kind of paper made for the purpose.

The grey paper, which covers pill-boxes as they come from abroad, is one of the best for this purpose: it does not easily break when wetted, or tinge the liquor which passes through it, which the reddish sort called *blotting paper* frequently does. The paper is supported by a funnel or piece of canvas fixed in a frame. When the funnel is used, it is convenient to put some straws or small sticks between the paper and its sides, to prevent the weight of the liquor from pressing the paper so close to it, as not to allow room for the fluid to transude. In some cases a funnel made of wire is put between the paper and the glass funnel. There is also a kind of glass funnel with ridges down its sides made on purpose for this use.

Glutinous and unctuous liquors, which do not easily pass through the pores of a filter or strainer, are clarified by beating them up with whites of eggs; which concreting and growing hard when heated, and entangling the impure matter, arise with it to the surface: the mixture is to be gently boiled till the scum begins to break, when the vessel is to be removed from

the fire, the crust taken off, and the liquor passed thro' a flannel bag.

Decantation, colature, and filtration, are applicable to most of the medicated liquors that stand in need of purification. Despumation and clarification very rarely have place; since these, along with the impurities of the liquor, frequently separate its medicinal parts. Thus, if the decoction of poppy heads, for making diacodium, be solicitously skimmed or clarified, the medicine will lose almost all that the poppies communicated; and instead of a mild opiate, turns out little other than a plain syrup of sugar.

It may be proper to observe, that the common sorts of filtering paper are apt to communicate a disagreeable flavour: and hence in filtering fine biters or other liquors, whose gratefulness is of primary consequence, the part which passes through first ought to be kept apart for inferior purposes.

SECT. IV. CRYSTALLIZATION.

WATER, assisted by heat, dissolves a larger proportion of most saline substances than it can retain when grown cold; hence, on the abatement of the heat, a part of the salt separates from the menstruum, and concretes at the sides and bottom of the vessel. The concretions, unless too hastily formed by the sudden cooling of the liquor, or disturbed in their coalescence by agitation, or other similar causes, prove transparent and of regular figures, resembling in appearance the natural spring-crystals.

Salts, dissolved in a large quantity of water, may in like manner be recovered from it in their crystalline form, by boiling down the solution, till so much of the fluid has exhaled as that the remainder will be too little to keep the salt dissolved when grown perfectly cold. It is customary to continue the evaporation till the salt shows a disposition to concrete even from the hot water, by forming a pellicle on that part which is least hot, *viz.* on the surface. If large, beautiful, and perfectly figured crystals are required, this point is somewhat too late: for if the salt thus begins to coalesce whilst considerably hot, on being removed into a cold place its particles will run too hastily and irregularly together: the pellicle at the same time falling down through the liquor, proves a farther disturbance to the regularity of the crystallization.

In order to perform this process in perfection, the evaporation must be gentle, and continued no longer than till some drops of the liquor, let fall on a cold glass-plate, discover crystalline filaments. When this mark of sufficient exhalation appears, the vessel is to be immediately removed from the fire into a less warm but not cold place, and covered with a cloth to prevent the access of cold air, and consequently the formation of a pellicle.

The fixed alkalis, especially the mineral, when fully saturated with fixed air or the aerial acid, assume a crystalline form; but these crystals are not so perfect as when the same alkalis are united with the other acids; the volatile alkalis cannot crystallize, because they escape before the menstruum extrudes.

Some even of the other neutral salts, particularly those of which certain metallic bodies are the basis, are so strongly retained by the aqueous fluid, as not to exhibit any appearance of crystallization, unless some other

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Causes, nature, and methods of crystallization.

other substance be added, with which the water has a greater affinity. The Table of Affinity shows that spirit of wine is such a substance; by the prudent addition of which, these kinds of salt separate freely from the menstruum and form large and beautiful crystals scarcely obtainable by any other means.

The operator must be careful not to add too much of the spirit; lest, instead of a gradual and regular crystallization, the basis of the salt be hastily precipitated in a powdery form. One twentieth part of the weight of the liquor will in most cases be a sufficient, and in some too large a quantity.

Different salts require different quantities of water to keep them dissolved; and hence, if a mixture of two or more be dissolved in this fluid, they will begin to separate and crystallize at different periods of the evaporation. Upon this foundation, salts are freed not only from such impurities as water is not capable of dissolving and carrying through the pores of a filter, but likewise from admixtures of each other; that which requires most water to dissolve shooting first into crystals.

It is proper to remark, that a salt, when crystallizing, still retains and combines with a certain portion of water: this water is not essential to the salt as a salt, but is essential to a salt as being crystallized; it is therefore called by the chemists the *water of crystallization*. The quantity of this water varies in different salts: In some of them, as in Glauber's salt, alum, and copperas, it makes up about one half of their weight; in others, as in nitre, common salt, and especially selenites, it is in very small quantity. As salts unite to the water of their crystallization by their attraction for water alone, we accordingly find that this water is perfectly pure, and contains, in complete crystals, no substance foreign to the salt. Salts not only differ in the quantity of water necessary to their solution, but some of them are also soluble with equal facility in cold as in hot water. Sometimes then we employ evaporation; sometimes cooling; and at other times both these expedients are used alternately, to separate different salts dissolved in the same liquor. It is obvious, then, that those which are nearly or equally soluble in cold as in boiling water, can only be crystallized by evaporation; those again, which are much more soluble in boiling than in cold water, are to be separated by cooling. Of the first of these is common or marine salt; of the latter is nitre or saltpetre. It remains, then, that we should know how to separate these two salts, when both of them happen to be dissolved in the same water; this method consists in alternate evaporation and cooling. If in such a solution a pellicle appears in the boiling liquor before crystals can be formed in the cooling, we then conclude that the common salt predominates: In this case we evaporate the water, and separate the common salt as fast as it is formed, till the liquor on cooling shows crystals of nitre: we then allow the nitre to crystallize by cooling. After all the nitre which had been dissolved by the heat alone has now separated by cooling, we resume the evaporation, and separate the common salt till the cooling liquor again shows crystals of nitre. We thus repeat the same series of operations, by which means these two salts may be alternately crystallized; the one by evaporation, the other by cooling, till they

are perfectly separated from each other. If in the beginning of the operation the liquor had, upon trial, given crystals of nitre by cooling, before any pellicle appeared on its surface when boiling, this would have indicated that the nitre was predominant in the solution; the nitre in this case would have been crystallized, first by cooling, till the quantity of nitre exceeding that of the common salt having been separated, the common salt would next have crystallized in its turn by evaporation. The example we have now given may be applied to other salts, or to a number of salts which may happen to be dissolved in the same liquor. For though there are few so completely soluble in cold water as common salt, and few so scantily as nitre; yet there are scarcely two salts which either precisely show the same solubility or the same appearance of their crystals. It is obvious, too, that by crystallization we discover the peculiar predominant salt in any solution of mixed saline matter; but as one salt always takes down a small portion of another, it is necessary to redissolve the first products, and repeat the crystallization, in order to render the separation complete.

We see, then, that though the crystal appearance and form does not alter the salt itself, yet that this process affords an elegant method of discovering compound solutions of salts, of judging of their purity, and lastly of separating different salts very completely from each other. Crystallization, then, is one of the most important agents in pharmacy, and ought to be well understood. We shall attempt to explain the particular management in crystallizing particular salts, when we come to treat of each of them separately.

SECT. V. PRECIPITATION.

By this operation bodies are recovered from their solutions by means of the addition of some other substance, with which either the menstruum or the body dissolved have a greater affinity than they have with each other.

Precipitation, therefore, is of two kinds; one, where the substance superadded unites with the menstruum, and occasions that before dissolved to be thrown down; the other, in which it unites with the dissolved body, and falls along with it to the bottom. Of the first, we have an example in the precipitation of sulphur from alkaline lixivium by the means of acids; of the second, in the precipitation of mercury from aquafortis by sea-salt, or its acid.

The subjects of this operation, as well those which are capable of being precipitated as those which precipitate them, will readily appear from inspection of the Table of Affinity. See CHEMISTRY, page 438. The manner of performing it is so simple, as not to stand in need of any particular directions; no more being required than to add the precipitant by degrees as long as it continues to occasion any precipitation. When the whole of the powder has fallen, it is to be well *edulcorated*, that is, washed in several fresh parcels of water, and afterwards dried for use.

Where metals are employed as precipitants, as in the purification of martial vitriol from copper by the addition of fresh iron, they ought to be perfectly clean and free from any rusty or greasy matter; otherwise they will not readily, if at all, dissolve, and consequent-

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Nature of precipitation; and various methods of performing this operation

ly the precipitation will not succeed; for the substance to be precipitated separates only by the additional one dissolving and taking its place. The separated powder often, instead of falling to the bottom, lodges upon the precipitant; from which it must be occasionally shaken off, for reasons sufficiently obvious.

Though in this operation the precipitated powder is generally the part required for use, yet some advantage may frequently be made of the liquor remaining after the precipitation. Thus when fixed alkaline salt is dissolved in water, and sulphur dissolved in this lixivium, the addition of acids separates and throws down the sulphur only in virtue of the acid uniting with and neutralizing the alkali by which the sulphur was held dissolved; consequently, if the precipitation be made with the vitriolic acid, and the acid gradually dropt in till the alkali be completely satiated, that is, as long as it continues to occasion any precipitation or turbidness, the liquor will yield, by proper evaporation and crystallization, a neutral salt, composed of the vitriolic acid and fixed alkali, that is, vitriolated tartar. In like manner, if the precipitation be made with the nitrous acid, a true nitre may be recovered from the liquor; if with the marine, the salt called *spiritus salis marini conglutatus*; and if with the acid of vinegar, the *sul diureticus*.

SECT. VI. EVAPORATION.

EVAPORATION, the third method of recovering solid bodies from their solutions, is effected by the means of heat; which evaporating the fluid part, that is, forcing it off in steam, the matter which was dissolved therein is left behind in its solid form.

The general rules for evaporation are, to place the matter in a flat, shallow, wide vessel, so that a large surface of the liquor may be presented to the air; for it is only from the surface that evaporation takes place. The degree of heat ought to be proportioned to the volatility of the substance to be evaporated, and to the degree of the fixity of the matter to be left: thus, the less fixed the matter to be left is, and the more strongly it adheres to the volatile parts, the less the degree of heat ought to be; and in such cases, too, a forcible current of air is sometimes scarcely admissible: on the contrary, when the matter to be evaporated is not very volatile, and when the matter to be left is very fixed, and does not adhere strongly to the volatile part, the evaporation may be urged by a strong heat, aided by a current of air directed upon the surface of the liquor.

This process is applicable to the solutions of all these substances which are less volatile than the menstruum, or which will not exhale by the heat requisite for the evaporation of the fluid; as the solutions of fixed alkaline salts; of the gummy, gelatinous, and other inodorous parts of vegetables and animals in water; and of many resinous and odorous substances in spirit of wine.

Water extracts the virtues of sundry fragrant aromatic herbs, almost as perfectly as rectified spirit of wine; but the aqueous infusions are far from being equally suited to this process with those made in spirit, water carrying off the whole odour and flavour of the subject which that lighter spirit leaves entire behind it. Thus a watery infusion of mint loses in evaporation the smell, taste, and virtues, of the herb; whilst a tincture drawn with pure spirit yields on the same treat-

ment a thick balsamic liquor, or solid gummy resin, extremely rich in the peculiar qualities of the mint.

In evaporating these kinds of liquors, particular care must be had, towards the end of the process, that the heat be very gentle; otherwise the matter as it grows thick will burn to the vessel, and contract a disagreeable smell and taste: this burnt flavour is called *empyreuma*. The liquor ought to be kept stirring during the evaporation; otherwise a part of the matter concretes on the surface exposed to the air, and forms a pellicle which impedes the farther evaporation.

SECT. VII. DISTILLATION.

In the foregoing operation fluids are rarefied by heat into steam or vapour, which is suffered to exhale in the air, but which it is the business of distillation to collect and preserve. For this purpose the steam is received in proper vessels, luted to that in which the subject is contained; and being there cooled, condenses into a fluid form again. 83
The nature of distillation, with observations on the manner of performing it.

There are two kinds of distillation; by the one, the more subtle and volatile parts of liquors are elevated from the grosser; by the other, liquids incorporated with solid bodies are forced out from them with vehemence by fire.

To the first belong the distillation of the pure inflammable spirit from vinous liquors; and of such of the active parts of vegetables as are capable of being extracted by boiling water or spirit, and at the same time of arising along with their steam.

As boiling water extracts or dissolves the essential oils of vegetables, while blended with the other principles of the subject, without saturation, but imbibes only a determinate, and that a small proportion of them, in their pure state; as these oils are the only substances contained in common vegetables, which prove totally volatile in that degree of heat; and as it is in them that the virtues of aromatics, and the peculiar odour and flavour of all plants, reside;—it is evident, that water may be impregnated by distillation, with the more valuable parts of many vegetables: that this impregnation is limited, the oil arising in this process pure from those parts of the plant which before rendered it soluble in water without limitation; hence the greatest part of the oil separates from the distilled aqueous liquor, and, according to its greater or less gravity, either sinks to the bottom or swims on the surface: that consequently infusions and distilled waters are very different from each other: that the first may be rendered stronger by pouring the liquor on fresh parcels of the subject; but that the latter cannot be in like manner improved by cohobating or redistilling them from fresh ingredients.

As the oils of many vegetables do not freely distil with a less heat than that in which water boils; as rectified spirit of wine is not susceptible of this degree of heat; and as this menstruum totally dissolves these oils in their pure state; it follows, that spirit elevates far less from most vegetables than water; but that nevertheless the distilled spirit, by keeping all that it does elevate perfectly dissolved, may, in some cases, prove as strong of the subject as the distilled water. The more gentle the heat, and the slower the distillation goes on, the volatile parts are the more perfectly separated in their native state.

It may be observed, that as the parts which are preserved in evaporation cannot arise in distillation, the liquor remaining after the distillation, properly depurated and inspissated, will yield the same extracts as those prepared from the tincture or decoction of the subject made on purpose for that use; the one of these operations collecting only the volatile parts, and the other the more fixed; so that where one subject contains medicinal parts of both kinds, they may thus be obtained distinct, without one being injured by the process which collects the other.

The subjects of the second kind of distillation are, the gross oils of vegetables and animals, the mineral acid spirits, and the metallic fluid quicksilver; which as they require a much stronger degree of heat to elevate them than the foregoing liquors can sustain, so they likewise condense without arising so far from the action of the fire. The distillation of these is performed in low glass vessels, called, from their neck being bent to one side, *retorts*: to the farther end of the neck a receiver is luted, which standing without the furnace, the vapours soon condense in it, without the use of a refrigeratory: nevertheless, to promote this effect, some are accustomed, especially in warm weather, to cool the receiver, by occasionally applying wet clothes to it, or keeping it partly immersed in a vessel of cold water.

The vapours of some substances are so sluggish, or strongly retained by a fixed matter, as scarce to arise even over the low neck of the retort. These are most commodiously distilled in straight-necked earthen vessels called *longnecks*, laid on their sides, so that the vapour passes off laterally with little or no ascent: a receiver is luted to the end of the neck without the furnace. In this manner, the acid spirit of vitriol is distilled. The matter which remains in the retort or longneck, after the distillation, is vulgarly called *caput mortuum*.

In these distillations, a quantity of elastic air is frequently generated; which, unless an exit be allowed, blows off or bursts the receiver. The danger of this may in good measure be prevented, by slowly raising the fire; but more effectually by leaving a small hole in the luting, to be occasionally opened or stopt with a wooden plug; or inserting at the juncture an upright pipe of such a height, that the steam of the distilling liquor may not be able to rise to the top; but it is still better done by fitting to the apparatus other vessels, by which their vapours may be condensed. For the process of distilling, and the apparatus made use of, see DISTILLATION; and CHEMISTRY, n^o 574.

SECT. VIII. SUBLIMATION.

As all fluids are volatile by heat, and consequently capable of being separated, in most cases, from fixed matters, by the foregoing process; so various solid bodies are subjected to a similar treatment. Fluids are said to *distil*, and solids to *sublime*; though sometimes both are obtained in one and the same operation. If the subliming matter concretes into a mass, it is commonly called a *sublimate*; if into a powdery form, *flowers*.

The principal subjects of this operation are, volatile alkaline salts; neutral salts, composed of volatile alkalis and acids, as sal ammoniac; the salt of amber,

and flowers of benzoin; mercurial preparations; and sulphur. Bodies of themselves not volatile, are frequently made to sublime by the mixture of volatile ones: thus iron is carried up by sal ammoniac in the preparation of the *flores martiales*, or *ferrum ammoniacale*.

The fumes of solid bodies in close vessels rise but little way, and adhere to that part of the vessel where they concrete. Hence a receiver or condenser is less necessary here than in the preceding operation; a single vessel, as a matrafs, or tall phial, or the like, being frequently sufficient.

SECT. IX. EXPRESSION.

The press is chiefly made use of for forcing out the juices of succulent herbs and fruits, and the insipid oils of the unctuous seeds and kernels.

The harder fruits, as quinces, require to be previously well beat or ground; but herbs are to be only moderately bruised. The subject is then included in a hair bag, and pressed between wooden plates, in the common screw-press, as long as any juice runs from it.

The expression of oils is performed nearly in the same manner as that of juices: only here, iron-plates are substituted for the wooden ones there made use of. The subject is well pounded, and included in a strong canvas bag, between which and the plates of the press a haircloth is interposed.

The insipid oils of all the unctuous seeds are obtained, uninjured, by this operation, if performed without the use of heat; which, though it greatly promotes the extraction of the oil, at the same time impresses an ungrateful flavour, and increases its disposition to grow rancid.

The oils expressed from aromatic substances generally carry with them a portion of their essential oil; hence the smell and flavour of the expressed oils of nutmegs and mace. They are very rarely found impregnated with any of the other qualities of the subject: oil of mustard-seed, for instance, is as soft and void of acrimony as that of the almond, the pungency of the mustard remaining entire in the cake left after the expression.

SECT. X. EXSICCATION.

THERE are two general methods of exsiccating or drying moist bodies; in the one, their humid parts are exhaled by heat; in the other, they are imbibed or absorbed by substances whose soft and spongy texture adapts them to that use. Bodies intimately combined with, or dissolved in a fluid, as recent vegetables and their juices, require the first; such as are only superficially mixed, as when earthy or indissoluble powders are ground with water, are commodiously separated from it by the second.

Vegetables and their parts are usually exsiccated by the natural warmth of the air: the assistance of a gentle artificial heat may, nevertheless, in general, be not only safely, but advantageously, had recourse to. By a moderate fire, even the more tender flowers may be dried, in a little time, without any considerable loss either of their odour or lively colour; which would both be greatly injured or destroyed by a more slow exsiccation in the air. Some plants, indeed, particularly

larly those of the acrid kind, as horse-radish, scurvy-grass, and arum, lose their virtues by this process, however carefully performed; but far the greater number retain them unimpaired, and often improved.

The thicker vegetable juices may be exsiccated by the heat of the sun; or, where this is not sufficient, by that of a water-bath, or an oven moderately warm. The thinner juices may be gently boiled till they begin to thicken, and then treated as the foregoing. The process, termed *inspissation* or *evaporation*, has been spoken of already. The juices of some plants, as arum root, briony root, orris root, wild cucumbers, &c. separate, upon standing for some time, into a thick part, which falls to the bottom; and a thin aqueous one, which swims above it: this last is to be poured off, and the first exsiccated by a gentle warmth. Preparations of this kind have been usually called *facule*; that of the cucumber, to be spoken of in its place, is the only one which practice now retains.

Indissoluble bodies, mixed with water into a thick consistence, may be easily freed from the greatest part of it, by dropping them on a *chalkstone*, or some powdered chalk pressed into a smooth mass, which readily imbibes their humidity. Where the quantity of fluid is large, as in the edulcoration of precipitates, it may be separated by decantation or filtration.

We before observed, that one of the principal circumstances favouring fermentation, was a certain degree of moisture. Exsiccation is therefore employed to dissipate humidity, and render vegetables thereby less liable to those changes produced by a kind of insensible fermentation.

SECT. XI. COMMINATION.

COMMINATION is the bare reduction of solid coherent bodies into small particles or powder. The methods of effecting this are various, according to the texture of the subject.

Dry friable bodies, or such as are brittle and not very hard, and mixtures of these with somewhat moist ones, are easily pulverised in a mortar.

For very light dry substances, resins, and the roots of tenacious texture, the mortar may in some cases be previously rubbed with a little sweet oil, or a few drops of oil be occasionally added: this prevents the finer powder of the first from flying off, and the others from cohering under the pestle. Camphor is commodiously powdered by rubbing it with a little rectified spirit of wine.

Tough substances, as woods, the peels of oranges and lemons, &c. are most conveniently rasped; and soft oily bodies, as nutmegs, passed through a grater.

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The comminution of the harder minerals, as calamine, crystal, flint, &c. is greatly facilitated by extinction; that is, by heating them red-hot, and quenching them in water: by repeating this process a few times, most of the hard stones become easily pulverisable. This process, however, is not to be applied to any of the alkaline or calcareous stones; lest, instead of an insipid powder, we produce an acrimonious calx or lime.

Some metals, as tin, though strongly cohering in their natural state, prove extremely brittle when heated, inasmuch as to be easily divided into small particles by dexterous agitation. Hence the official method of pulverising tin, by melting it, and at the instant of its beginning to return into a state of solidity, briskly shaking it in a wooden box. The comminution of metals, in this manner, is termed by the metallurgists *granulation*.

On a similar principle, certain salts, as nitre, may be reduced into powder in large quantity, by dissolving them in boiling water, setting the solution over a moderate fire, and keeping the salt constantly stirring during its exsiccation, so as to prevent its particles, disjoined by the fluid, from reuniting together into larger masses.

Powders are reduced to a great degree of fineness by triturating, or rubbing them, for a length of time, in a mortar. Such as are not dissoluble in water, or injured by the admixture of that fluid, are moistened with it into the consistence of a paste, and levigated or ground in a flat smooth marble or iron plate; or where a large quantity is to be prepared at a time, in mills made for that use.

Comminution, though one of the most simple operations of pharmacy, has, in many cases, very considerable effect. The resinous purgatives, when finely triturated, are more easily soluble in the animal fluids, and consequently prove more cathartic, and less irritating, than in their grosser state. Crude antimony, which, when reduced to a tolerably fine powder, discovers little medicinal virtue, if levigated to a great degree of subtilty, proves a powerful medicine in many chronic disorders.

By comminution, the heaviest bodies may be made to float in the lightest fluids (c), for a longer or shorter time, according to their greater or less degree of tenuity. Hence we are furnished with an excellent criterion of the fineness of certain powders, and a method of separating the more subtile parts from the grosser, distinguished by the name of *elutriation* or *washing over*.

Qq

SECT.

(c) Some attribute this effect to a diminution of the specific gravity of the body; and, at the same time, suppose the peculiar virtues of certain medicines, particularly mercury, to be in great measure owing to their gravity. If these hypotheses were just, it should follow, that the mercurial preparations, by being finely comminuted, would lose proportionably of their efficacy; and so indeed mercurius dulcis, for instance, has been supposed to do. But experience shows, that this is far from being the case; and that comminution by no means lessens but rather increases its power: when reduced to a great degree of subtilty, it passes readily into the halit, and operates, according to its quantity, as an alterative or a sialogogue; while in a grosser form, it is apt to irritate the stomach and bowels, and run off by the intestines, without being conveyed into the blood.

Fusion is the reduction of solid bodies into a state of fluidity by fire. Almost all natural substances, the pure earths and the solid parts of animal and vegetable excepted, melt in proper degrees of heat; some in a very gentle heat, while others require a much violent heat.

Turpentine, and other soft resinous solid ones, liquefy in a gentle warmth; wax, pitch, sulphur, and the mineral bitumens, require a heat too great for the hand to support; fixed alkaline salts, common salt, nitre, require a red or almost white heat to melt them; and glass, a full white heat.

Among metallic substances, tin, bismuth, and lead, flow long before ignition; antimony likewise melts before it is visibly red-hot, but not before the vessel is considerably so; the regulus of antimony demands a much stronger fire. Zinc begins to melt in a red heat; gold and silver require a low white heat; copper a bright white heat; and iron an extreme white heat.

One body, rendered fluid by heat, becomes sometimes a menstruum for another, not fluid in itself in the same degree of fire. Thus red-hot silver melts on being thrown into melted lead less hot than itself; and thus if steel, heated to whiteness, be taken out of the furnace, and applied to a roll of sulphur, the sulphur instantly liquefying, occasions the steel to melt with it; hence the *charcoal cum sulphure* of the shops. This concrete, nevertheless, remarkably impedes the fusion of some other metals, as lead; which when united with a certain quantity of sulphur is scarce to be perfectly melted by a very strong fire. Hence the method, described in its place, of purifying zinc; a metal upon which sulphur has no effect from the lead so frequently mixed with it.

Sulphur is the only unmetallic substance which mingles in fusion with metals. Earthy, saline, and other like matters, even the calces and glasses prepared from metals themselves, float distinct upon the surface, and form what is called *scoria* or *drofs*. Where the quantity of this is large in proportion to the metal, it is most commodiously separated by pouring the whole into a conical mould: the pure metal or *regulus*, though small in quantity, occupies a considerable height in the lower narrow part of the cone; and when congealed, may be easily freed from the scoriae by a hammer. The mould should be previously greased, or rather smoked, to make the metal come freely out; and thoroughly dried and heated, to prevent the explosion which sometimes happens from the sudden contact of melted metals with moist bodies.

SECT. XIII. CALCINATION.

Calcination is understood the reduction of solid bodies, by the means of fire, from a coherent to a powdery state, accompanied with a change of their quality; in which last respect this process differs from comminution.

To this head belong the burning of vegetable and animal matters, otherwise called *ustion*, *incineration*, or *concremation*; and the change of metals into a powder, which in the fire either does not melt or vitrifies, that is, runs into glass.

The metals which melt before ignition, are calcined by keeping them in fusion for some time. The free admission of air is essentially necessary to the success of this operation; and hence, when the surface of the metal appears covered with calx, this must be taken off or raked to one side, otherwise the remainder excluded from the air will not undergo the change intended. If any coal, or other inflammable matter which does not contain a mineral salt, be suffered to fall into the vessel, the oil expressed from this operation will not be produced, and part of what is already calcined will be revived or renewed; that is, it will return into its metallic form again.

Those metals which require a strong fire for fusion, calcine with a much less heat than is sufficient to make them flow. Hence the burning or fusion of such iron or copper vessels as are long exposed to a considerable fire without defence from the air. Gold and silver are not calcinable by any degree of fire.

In calcination, the metals visibly emit fumes: nevertheless the weight of the calx proves greater than that of the metal employed. The antimonial regulus gains about one eleventh part of its weight; zinc sometimes one tenth; tin above one sixth; and lead in its conversion into minium often one fourth.

The calcination of most bodies, gold, silver, and mercury excepted, is greatly promoted by nitre. This salt exposed to the fire in conjunction with any inflammable substances, extricates their inflammable matter, and burns with it into flame, accompanied with a hissing noise. This process is usually termed *deflagration* or *detonation*.

All the metallic calces and scoriae are revived into their metallic state by fusion with any vegetable or animal inflammable matter. They are all more difficult of fusion than the respective metals themselves; and scarcely any of them, those of lead and bismuth excepted, can be made to melt at all, without some addition, in the strongest fire that can be produced in the common furnaces. The additions called *fluxes*, employed for promoting the fusion, consist chiefly of fixed alkaline salts. A mixture of any one salt with inflammable matter, as powdered charcoal, is called a *reducing flux*, as contributing at the same time to bring the calx into fusion, and to revive it into metal. Such a mixture is commonly prepared from one part of nitre and two parts of tartar, by grinding them well together, setting the powders on fire with a bit of coal or a red-hot iron, then covering the vessel, and suffering them to deflagrate or burn till they are changed into a black alkaline coaly mass. This is the common *reducing flux* of the chemists, and is called from its colour the *black flux*. Metallic calces of scoriae, mingled with twice their weight of this compound, and exposed to a proper fire in a close covered crucible, melt and resume their metallic form; but though they received an increase of weight in the calcination, the revived metal is always found to weigh considerably less than the quantity from which the calx was made.

For a more particular account of all these processes, and an explanation of the principles on which they depend, see *CHEMISTRY passim*, and the articles themselves as they occur in the order of the alphabet.

PART II. PREPARATIONS AND COMPOSITIONS.

Containing those of the LONDON and EDINBURGH PHARMACOPŒIAS.

CHAP. I. *The more Simple Preparations.**The preparation of some substances not soluble in water. L.*

POUND these substances first in a mortar; then, pouring on a little water, levigate them on a hard and polished, but not calcareous, stone, that they may be made as fine as possible. Dry this powder on blotting-paper laid on chalk, and set it in a warm, or at least a dry, place, for some days.

In this manner are to be prepared,

Amber,

Antimony,

Calamine,

Coral,

Coral,

Oyster-shells, first cleansed from their impurities,

Tutty.

Crabs claws, first broken into small pieces, must be washed with boiling water before they be levigated.

Verdigrise must be prepared in the same manner.

Where large quantities of the foregoing powders are to be prepared, it is customary, instead of the stone and mallet, to employ hand-mills made for this purpose, consisting of two stones; the uppermost of which turns horizontally on the lower, and has an aperture in the middle, for supplying it with matter, or of returning that which has already passed, till it be reduced to a proper degree of fineness.

For the levigation of hard bodies, particular care should be taken, whatever kind of instruments be used, that they may be of sufficient hardness, otherwise they will be abraded by the powders. The hematites, a hard iron stone, is most conveniently levigated between two iron plates; for if the common levigating stones be used, the preparation, when finished, will contain almost as much foreign matter from the instrument as the hematites.

It has been found many to mixten several powders in levigation, with rose, balm, and other distilled waters: these, nevertheless, have no advantage above common water, since in the subsequent evaporation they must necessarily exhale, leaving the medicine possessed of no other virtue than what might be equally expected from it when prepared with the cheaper element.

Some hard bodies, indeed, are more advantageously mixed with spirit of wine, than with water. Thus, bezoar has the green colour usually expected in this earthy preparation, and is much improved thereby. A little spirit may be added to the other animal substances, if the weather be very hot, and large quantities of them are prepared at once, to prevent their running into putrefaction; on a client who in those circumstances sometimes happens when they are levigated with water only. Crab-eyes, which abound with animal gelatinous matter, are particularly liable to this inconvenience.

The caution given above for reducing antimony calamine, and tutty, to the greatest subtilty possible, demands particular attention. The tenderness of the parts to which the two last are usually applied, requires them to be perfectly free from any admixture of gross irritating particles. The first, when not thoroughly comminuted, might not only, by its sharp needle like spicula, wound the stomach, but likewise answers little valuable purpose as a medicine, proving either an useless load upon the viscera, or at best passing off without any other sensible effect than an increase of the grosser evacuations; while, if reduced to a great degree of fineness, it turns out a medicine of considerable efficacy.

The most successful method of obtaining these powders of the requisite tenuity, is, to wash off the finer parts by means of water, and continue levigating the remainder till the whole become fine enough to remain for some time suspended in the fluid; this process is received in the Edinburgh pharmacopœia, and there directed in the preparation of the following article.

Prepared antimony. E.

Let the antimony be first pounded in an iron mortar, and then levigated on a porphyry with a little water.

After this, put it into a large vessel, and pour a quantity of water on it. Let the vessel be repeatedly shaken, that the finer part of the powder may be diffused through the water; the superfluous is then to be poured off, and set by till the powder settles. The gross part, which the water would not take up, is to be further levigated, and treated in the same manner.

By this method, which is that commonly practised in the preparation of colours for the painter, powders may be obtained of any required degree of tenuity; and without the least mixture of the gross parts, which are always found to remain in them after long continued levigation: all the coarser matter settles at first, and the finer powder continues suspended in the water longer and longer, in proportion to the degree of its fineness. The same process may likewise be advantageously applied to other hard pulverisable bodies of the mineral kingdom, or artificial preparations of them; provided they be not soluble in, or specifically lighter than, water. The animal and absorbent powders, crabs-claws, crabs eyes, oyster-shells, eggs and shells, pearl, coral, and bezoar, are not well adapted to this treatment; nor indeed do they require it. These substances are readily soluble in most fluids without much comminution: if no acid be contained in the first passage, they are apt to be united with the gross matter usually mixed there, into hard insoluble masses; the greater degree of fineness they are reduced to, the more they are disposed to form such concretions, and become liable to obstruct the orifices of the small vessels.

Prepared calamine. E.

Calamine previously calcined for the use of those who make brasa, is to be treated in the same manner as antimony.

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Prepared chalk.

- 93 Chalk first triturated, and then frequently washed with water, till it imparts to it neither taste nor colour, is to be treated in the same manner as antimony.

As calamine is intended for external application, and often to parts very easily irritated, too much pains cannot be bestowed in reducing it to a fine powder; and the frequent washing of the chalk may have the effect of freeing it from some foreign matters: But with regard to this substance, the latter part of the process, if not improper, is, in our opinion at least, unnecessary: and this observation may also be made with respect to the oculi, or more properly lapilli cancerorum, which the Edinburgh college direct to be treated in the same manner.

The preparation of hog's lard and mutton suet. L.

- 94 Cut them into pieces, and melt them over a slow fire; then separate them from the membranes by straining.

These articles had formerly a place also among the preparations of the Edinburgh college: But now they introduce them only into their list of the materia medica; as the apothecary will in general find it more for his interest to purchase them thus prepared, than to prepare them for himself: for the process requires to be very cautiously conducted, to prevent the fat from burning or turning black.

The purification of gum ammoniacum. L.

- 95 If gum ammoniac do not seem to be pure, boil it in water till it become soft; then squeeze it through a canvas bag, by means of a press. Let it remain at rest till the resinous part subside; then evaporate the water; and toward the end of the evaporation restore the resinous part, mixing it with the gummy.

In the same manner are purified assafoetida and such like gum resins.

You may also purify any gum which melts easily, such as Galbanum, by putting it in an ox-bladder, and holding it in boiling water till it be so soft that it can be separated from its impurities by pressing through a coarse linen cloth.

In straining all the gums, care should be taken that the heat be neither great nor long continued; otherwise a considerable portion of the more active volatile matter will be lost; an inconvenience which cannot by any care be wholly avoided. Hence the purer tears, unstrained, are in general to be preferred, for internal use, to the strained gums.

As an additional reason for this preference, we may add, that some of the gum-resins, purified in the common way, by solution in water, expression and evaporation, are not so easily soluble in aqueous menstrua as before such depuration. On these accounts this process is entirely omitted by the Edinburgh college; and in every case where a gummy resinous substance, before it be taken, is to be dissolved in water,

it may be as effectually freed from impurities at the time of solution as by this process. And when it is to be employed in a solid state, care should be taken that the purer parts alone be selected.

The burning of hartshorn. L.

Burn pieces of hartshorn till they become perfectly white; then reduce them to a very fine powder.

The pieces of horn generally employed in this operation are those left after distillation.

In the burning of hartshorn, a strong fire and the free admission of air are necessary. The potter's furnace was formerly directed for the sake of convenience; but any common furnace or stove will do. If some lighted charcoal be spread on the bottom of the grate, and above this the pieces of the horns are laid, they will be burnt to whiteness, still retaining their original form.

Burnt hartshorn is not now considered as a pure earth, having been found to be a compound of calcareous earth and phosphoric acid. It is the weakest of the animal absorbents, and is difficultly soluble in acids; but whether it be of equal or superior use in diarrhoeas to more powerful absorbents, must be left to observation.

The drying of herbs and flowers.

Let these, spread out lightly, be dried by a gentle heat. L.

Herbs and flowers must be dried by a gentle heat, from a stove or common fire. They must be taken in such quantities at a time, that the process will be speedily finished; for by this means their medical powers are best preserved. The most certain test of this is the perfect preservation of the natural colour: but the leaves of cicuta, and of other plants containing a volatile matter, must be immediately pounded, after being dried, and afterwards kept in a phial with a ground stopper. E.

The directions given by the London college are here less explicit, and perhaps less proper, than those of the Edinburgh college: for there can be no doubt of the propriety of drying these substances hastily, by the aid of artificial heat, rather than by the heat of the sun. In the application of artificial heat, the only caution requisite is to avoid burning; and of this a sufficient test is afforded by the preservation of colour. And the direction given with regard to cicuta may perhaps with advantage be followed with most of the other flowers and herbs, afterwards to be exhibited in powder.

The purifying of honey. L.

Melt the honey by the heat of a water bath, and remove the scum.

The intention of this process is to purify the honey from wax, or other gross matters that have been united with it by the violence of the press in its separation from the comb, and from meal and such like substances, which are sometimes fraudulently mixed with it. When the honey is rendered liquid and thin by the heat, these lighter matters rise freely to the surface.

This preparation is not so necessary for honey that is to be used as an article of diet, as for that which is employed

employed in the preparation of oxymels: hence the Edinburgh college, who have rejected all the oxymels, have omitted this process.

The preparation of millipeds. L. E.

99 The millipeds are to be inclosed in a thin canvas cloth, and suspended over hot proof-spirit in a close vessel, till they be killed by the steam, and rendered friable.

This is a convenient way of rendering millipeds pulverisable, without endangering any loss of such virtues as they may possess.

The directions given by both colleges are precisely the same, and delivered in almost the same words.

The extraction of pulps. L. E.

100 Unripe pulpy fruits, and ripe ones if they be dry, are to be boiled in a small quantity of water until they become soft: then press out the pulp through a strong hair-sieve, and afterwards boil it down to the consistence of honey in an earthen vessel, over a gentle fire; taking care to keep the matter continually stirring, to prevent its burning.

The pulp of cassia fistularis is in like manner to be boiled out from the bruised pod, and reduced afterwards to a proper consistence, by evaporating the water.

The pulps of fruits that are both ripe and fresh, are to be pressed out through the sieve, without any previous boiling.

In the extraction of pulps, the direction of both colleges so nearly agree, that it is unnecessary to give a separate translation of each. We may only observe, that the London college, instead of softening the fruits by boiling them in a small quantity of water, direct them to be put in a moist place. This direction, though proper in some cases, is not generally the most suitable.

The drying of squills. L. E.

101 Let the squill, cleared from its outer skin, be cut transversely into thin slices, and dried with a very gentle heat. When properly managed, the squill is friable, and retains its bitterness and acrimony.

By this method the squill dries much sooner than when its several coats are only separated, as has been usually directed; the internal part is here laid bare, but, in each of the entire coats, it is covered with a thin skin, which impedes the exhalation of the moisture. The root loses in this process four-fifths of its original weight; the parts which exhale appear to be merely watery: six grains of the dry root being equivalent to half a dram of the fresh; a circumstance to be particularly regarded in the exhibition of this medicine. In the preceding editions of our pharmacopœias, a particular caution was given, not to use an iron knife for cutting squills, but one of wood, ivory, or bone: the reason of this caution is said to be, not so much that the squill would receive any ill qualities from the iron; as, that its acrid juice, adhering to the knife, might render a wound received by it extremely painful, or even dangerous: but as no danger is to be apprehended from such an accident, the direction appears unnecessary. Dried squills furnish us with a me-

dicine, sometimes advantageously employed as an emetic, often as an expectorant, but still more frequently as a powerful diuretic.

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The burning of sponge. L.

Beat the sponge, after cutting it in pieces; and, when separated from its gritty matter, burn it in a close iron vessel, until it becomes black and friable; afterwards rub it to a very fine powder. L.

Put the sponge, cut into small pieces, and well freed from adhering earthy matters, into a close earthen vessel. Place it on the fire, and let it be stirred frequently till it become black and friable; then reduce it to a powder in a glass or marble mortar. E.

This medicine has been in use for a considerable time, and employed against scrofulous disorders and cutaneous foulnesses, in doses of a scruple and upwards. Its virtues seem to depend on a volatile salt just formed, and combined with its own oil. If the sponge be distilled with a strong heat, it yields a large proportion of that salt in its proper form. The salt is in this preparation so far extricated, that if the burnt sponge be ground in a brass mortar, it corrodes the metal so as to contract a disagreeable taint, and sometimes an emetic quality.

Bees, earthworms, and other animal substances, have by some been prepared in the same manner, and recommended in different diseases: but as these substances fall much short of sponge in the quantity of volatile salt producible from them by fire, they are probably inferior also in medicinal efficacy. Of all the animal matters that have been tried, raw silk is the only one which exceeds or equals sponge, in the produce of salt.

A good deal of address is requisite for managing this process in perfection. The sponge should be cut small, and beaten for some time in a mortar, that all the stony matters may be got out, which compared with the weight of the sponge when prepared, will sometimes amount to a considerable quantity. The burning should be discontinued as soon as the matter is become thoroughly black. If the quantity put into the vessel at once be large, the outside will be sufficiently burnt before the inside be affected; and the volatile salt of the former will in part escape, before that in the latter is begun to be formed. The best method of avoiding this inconvenience seems to be, to keep the sponge continually stirring, in such a machine as is used for the roasting of coffee.

And from this circumstance the iron vessel directed by the London college is preferable to the earthen one directed by that of Edinburgh. But the pounding in a glass or marble mortar, directed by the latter, is a necessary caution which the former college have omitted.

The purification of storax. L.

Dissolve the storax in rectified spirit of wine, and strain the solution: afterwards reduce it to a proper thickness with a gentle heat.

Storax was formerly directed to be purified by means of water; hence it was styled *Syracis colatis*: but the method now adopted is much preferable, for the active parts

parts of the floras totally dissolve in spirit of wine, the impurities should be left. And as these active parts do not enter in solution, the spirit may be again recovered by distillation.

Purified filings of iron. E.

- 104 Apply a magnet to a sieve placed on films of iron, so that the things may be attracted upwards through the sieve.

Filings of iron, commonly called filings of iron, prepared. L.

- 105 Let the filings of iron in a moist place, that they may be rusted, which is to be ground into an impalpable powder.

The rusting of iron filings by means of a magnet is very tedious, and does not answer so well as might be expected; for if they are rusty, they will not be attracted by it, or not sufficiently; nor will they by this means be entirely freed from brass, copper, or other metallic substances which may adhere to them. It appears from the experiments of Henckel, that if iron be mixed by fusion with even its own weight of any of the other metals, namely of antimony alone excepted, the compound will be vigorously attracted by the lodestone. The rust of iron is to be procured at a moderate rate from the dealers in iron, free from any impurities except such as may be washed off by water.

The rust of iron is by some preferred as a medicine to the calces or croci made by a strong fire. Hoffmann relates, that he has frequently given it with remarkable success in obstinate chlorotic cases accompanied with excessive headachs and other violent symptoms; and that he usually joined with it pimpinella, anem. root, and salt of tartar, with a little cream and form. The dose is from four or five grains to twenty or thirty; some have gone as far as a dram; but all the preparations of this metal answer best in small doses, which should rather be often repeated than enlarged.

Scales of iron purified. E.

- 106 Let the scales of iron, which may be had at the anvils or the workmen, be purified by the magnet; for the magnet only attracts the smaller and purer parts, leaving the more thick and impure behind.

This is perhaps of all the forms the most eligible for obtaining the pure matter in such a divided state as to render it easily acted on by different menstrua; and the mode of purification here proposed is not only very effectual, but also very easily put into practice.

The extraction of mullage. Gen.

- 107 Boil the gums or mucilaginous feeds in a sufficient quantity of water till become viscid, nearly resembling the white of an egg; and then strain it by passing it through a linen cloth.

This mullage or mucilage may be easily obtained from many of our substances in its pure state. And although this process is not directed in our pharmacopoeia, yet we think that it might with advantage be adopted.

CHAP. II. Of Conerves.

Conerves are compositions of recent vegetable matters and sugar, beaten together into an uniform mass.

This management is introduced for preserving certain simples, in which, in an agreeable form, with as little alteration as possible in their native virtues; and to some extent it is very advantageously applied. Vegetables, whose virtues are lost or destroyed by drying, may in this form be kept unaltered for a month or more: for, by carefully closing the mouth of the containing vessel, the alteration, as well as dissipation, of their active principles is generally prevented; and the sugar preserves them from the corruption which juicy vegetables would otherwise undergo. There are, however, sundry vegetables whose virtues are impaired by this treatment. Mucilaginous substances by long lying with sugar, become less glutinous; and astringents become less fully tasted on the palate. Many of the fragrant flowers are of too tender and delicate a texture, as almost entirely to lose their peculiar qualities on being beaten or mixed.

In general, it is obvious, that in this form, on account of the large admixture of sugar, instances of considerable activity can alone be taken to advantage as medicines. And, indeed, conerves are at present considered chiefly as auxiliaries to medicines of greater efficacy, or as intermediates for joining them together. They are very convenient for reducing into boluses or pills the more ponderous powders, as mercurius dulcis, the calces of iron, and other mineral preparations; which, with liquid or less consistent matters, as syrups, will not cohere.

The shops were formerly encumbered with many conerves, the most of them insipid; the few now retained have in general either an agreeable flavour to recommend them, or are capable of answering some special purposes as medicines. Their common dose is the bulk of a nutmeg, or as much as can be taken up at once or twice upon the point of a knife. There is in general no great danger of exceeding in this particular.

Conerves of rose of sharon;

sea wormwood;

the red rose;

the outer rind of the Seville orange. L.

Pluck the leaves from the flowers, the small twigs, &c. from the cups, taking off the stalks. Take off the outer rind of the orange by a grater; then cut each of them with a wooden peeler in a middle part, first by themselves, afterwards with three times their weight of double refined sugar, until they be mixed.

Conerves of the fresh leaves of mint;

the leaves of lemon;

the outer rind of Seville oranges rasped off by a grater. L.

These are directed to be prepared with triple their weight of sugar in the same manner as the conerves of the London college. The sugar should be powdered by itself, and passed through a sieve before it be mixed with the vegetable masts; for without this it cannot

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cannot be properly incorporated. Rose buds, and some other vegetables, are prepared for mixing with sugar by a small wooden mill contrived for that purpose.

In the same manner conferves may be prepared from many other vegetables. It includes the conferves for which general directions are given, there are others, for which, either on account of the particular mode of preparation, or of the preparation, our pharmacopœia have thought it necessary to give particular directions. But before taking notice of these, it is necessary to mention the medical properties of the conferves above enumerated.

Conferve of the leaves of wood sorrel. L.

109 This is a very elegant and grateful conferve; in taste it is lightly acidulous, with a peculiar flavour, which some compare to that of green-tea. It is taken occasionally for quenching thirst, and cooling the mouth and fauces, in distempers where the heat of the body is much increased.

Conferve of the tops of sea wormwood. L.

110 The conferve of wormwood has been celebrated in dropries: Mercurialis relates, that several persons were cured by it of that disorder without the assistance of any other medicine. Where the disorder indeed proceeds from a simple laxity or fluidity of the solids, the continued use of this medicine may be of some service; as it appears to be an elegant mild corroborant. It is directed to be given in the dose of half an ounce about three hours before meals.

Conferve of the buds of red roses. L. E.

111 This is a very agreeable and useful conferve. A dram or two dissolved in warm milk are frequently given as a light aperient, in weaknes of the stomach, and likewise in coughs and phthical complaints. In the German ephemerides, examples are related of very dangerous phthisis cured by the continued use of this medicine: In one of these cases, twenty pounds of the conferve were taken in the space of a month; and in another, upwards of thirty. Riverius mentions several other instances of this kind. There is, however, much room for fallacy in such observations; as phthisis has not at all times been accurately distinguished from other catarrhs, and some other affections; the antiseptic property of the sugar may perhaps have some share in the effect.

Conferve of the yellow rind of Seville orange-peel. L. E.

112 This conferve is a very elegant one, containing all the virtues of the peel in a form sufficiently agreeable, both with regard to the dose and the convenience of taking. It is a pleasant warm stomachic; and with this intention is frequently used.

Conferve of the leaves of spearmint. E.

113 The conferve of mint retains the taste and virtues of the herb. It is given in weaknes of the stomach and retchings to vomit: and frequently does service in some cases of this kind, where the warmer and more active preparations of mint would be less proper.

Conferve of arum.

114 Take of the fresh root of arum bruised, half a pound;

double refined sugar, a pound and a half. Beat them together in a mortar.

The root of arum, in its recent state, is a violent source of the activity; but this activity is the necessary lodger in it. Hence the conferve and powder which had formerly a place in our pharmacopœia is now rejected. And as neither water nor spirit enters this activity, the conferve is perhaps the best form in which it can be preserved in our shops. It may be given to adults in doses of a dram.

Conferve of hips. L.

Take of pulp of ripe hips one pound; double refined sugar, powdered, twenty ounces. Mix them into a conferve.

115

The conferve of hips is of some esteem as a soft cooling refrigerant; three or four drams or more are given at a time, in bilious fluxes, sharpness of urine, and hot indispositions of the stomach: A good deal of care is requisite on the part of the apothecary in making this conferve: the pulp is apt to carry with it force of the prickly fibres, with which the inside of the fruit is lined; if these be retained in the conferve, they will irritate the stomach, so as to occasion vomiting.

Conferve of flos. L. E.

Put the flos in water upon the fire that they may soften, taking care that they be not broken; then, the flos being taken out of the water, press out the pulp, and mix it with three times its weight of double refined sugar into a conferve.

116

This preparation is a gentle astringent, and may be given as such in the dose of two or three drams. The degree of its astringency will vary according to the maturity of the flos, and the length of time for which the conferve has been kept.

Conferve of squills.

Take of fresh squills, one ounce; double-refined sugar, five ounces. Beat them together in a mortar into a conferve.

117

This conferve is directed to be prepared in a small quantity, to guard against its varying in strength. It may be given to adults from half a dram to two scruples, especially when fresh.

But the conferve of squills is a more uncertain and less agreeable mode of exhibiting this article, than the powder of the dried root, particularly when made into pills, or given in the form of lozenges with any other conferve.

Conferve of lavender. Succ.

Take of fresh leaves of chervil, double refined sugar, each equal parts. Beat them together into a conferve.

118

Chervil has by some been extolled as an useful diuretic; and this is perhaps one of the most pleasant forms under which it can be exhibited.

Conferve of millipeds. Brun.

Take of live millipeds, one pound; double refined sugar, two pounds, and an half. Beat them together into a conferve.

119

If the millipeds possess those virtues which some have alleged, this is perhaps one of the best forms in

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der which they can be exhibited. And by children, to whom they are frequently prescribed, it may be easily taken, when other forms cannot be introduced.

Vitriolated conserve of roses. Brun.

- 120 To each pound of the conserve of roses add two drams of the diluted vitriolic acid.

This may be in some cases an useful means of increasing somewhat the astringency of the conserve of roses: But for the purposes for which the vitriolic acid is in general employed, the quantity that can thus be introduced is too inconsiderable to be of much service.

CHAP. III. Of Juices.

- 121 Juices are obtained from the succulent parts of plants, by including them, after being properly cut, bruised, &c. in a hair bag, and pressing them, between wooden cheeks, in the common screw press, as long as any liquor exudes.

The harder fruits require to be previously well beaten or ground; but herbs are to be only moderately bruised, for if these are over-bruised, a large quantity of the herbaceous matter will be forced out along with the juice. Hempen or woollen bags are apt to communicate a disagreeable flavour; the threads of these likewise swell in proportion as they imbibe moisture, so as in great measure to prevent the free percolation of the juice.

The fluids thus extracted from succulent fruits, both of the acid and sweet kind, from most of the acrid herbs, as scurvy-grass and water-cresses, from the acid herbs, as sorrel and wood-sorrel, from the aperient lactescent plants, as dandelion and hawkweed, and from sundry other vegetables, contain great part of the peculiar taste and virtues of the respective subjects. The juices, on the other hand, extracted from most of the aromatic herbs as those of mint and the fragrant Turkey balm, commonly called *balm of Gilead*, have scarcely any thing of the flavour of the plants, and seem to differ little from decoctions of them made in water boiled till the volatile odorous parts have been dissipated. Many of the odoriferous flowers, as the lily, violet, hyacinth, not only impart nothing of their fragrance to their juice, but have it totally destroyed by the previous bruising. From want of sufficient attention to these particulars, practitioners have been frequently deceived in the effects of preparations of this class: juice of mint has been often prescribed as a stomachic, tho' it wants those qualities by which mint itself and its other preparations operate.

The juices, thus forcibly pressed out from plants, differ from those which flow spontaneously, or from incisions; these last consisting chiefly of such fluids as are not diffused through the whole substance of the vegetable subject, but elaborated in distinct vessels, or secreted into particular receptacles. From poppy heads, slightly wounded, there issues a thick milky liquor, which dries by a moderate warmth into opium; whilst the juice obtained from them by pressure is of a dark-green colour, and far weaker virtue.

Juices newly expressed are generally thick, viscid, and very impure: By colature, a quantity of gross matter is separated, the juice becomes thinner, limpid, and better fitted for medicinal purposes, though as yet

not entirely pure: on standing, it becomes again turbid, and apt to run into a fermentative or putrefactive state. Clarification with whites of eggs renders the juices more perfectly fine; but there are few that will bear this treatment without a manifest injury to their flavour, taste, and virtue.

The most effectual method of purifying and preserving these liquors, is to let the strained juices stand in a cool place till they have deposited their grosser feces, and then gently pass them several times through a fine strainer till perfectly clear; when about a fortieth part of their weight of good spirit of wine may be added, and the whole suffered to stand as before: a fresh sediment will now be deposited, from which the liquor is to be poured off, strained again, and put into small bottles which have been washed with spirit and dried. A little oil is to be poured on the surface, so as very nearly to fill the bottles, and the mouths closed with leather, paper, or stopped with straw, as the flasks in which Florence wine is brought to us: this serves to keep out dust, and suffers the air, which in process of time arises from all vegetable liquors, to escape; which air would otherwise endanger the bursting of the bottles; or, being imbibed afresh, render their contents rapid and foul. The bottles are to be kept on the bottom of a good cellar or vault, placed up to the necks in sand. By this method some juices may be preserved for a year or two; and others for a much longer time.

It has already been observed, that there are great differences in juices, in regard to their being accompanied in the expression with the virtues of the subjects. There are equal differences in regard to their preserving those virtues, and this independently of the volatility of the active matter, or its disposition to exhale. Even the volatile virtue of scurvy-grass may by the above method be preserved almost entire in its juice for a considerable time: while the active parts of the juice of the wild cucumber quickly separate and settle to the bottom, leaving the fluid part inert. Juices of arum root, iris root, bryony root, and sundry other vegetables, throw off in like manner their medicinal parts to the bottom.

Compound juice of scurvy-grass.

Take of the juice of garden scurvy-grass two pints; brook lime and water-cresses, of each one pint; Seville oranges, twenty ounces by measure. Mix them, and, after the feces have subsided, pour off the liquor, or strain it. *L.*

Take of juice of garden scurvy-grass, water-cresses, both expressed from the fresh herbs, Seville oranges, of each two pounds; spirituous nutmeg-water, half a pound. Mix them and let them stand till the feces have subsided, then pour off the clear liquor. *E.*

By this formula the Edinburgh college have rejected the brook lime and the sugar of their former editions. The sugar was certainly a very improper addition; for though it may preserve dry vegetable matters, yet when added to juices largely impregnated with watery and mucilaginous matter, it would no doubt furnish that very principle most favourable to the production of the vinous fermentation. For the compound horse-radish water they have substituted the spirituous water of nutmegs: Besides that, this water has the same property

of preserving the juices from fermentation; it is also much more agreeable to the palate, and will make the juices sit easier on the stomach.

The London college have retained nearly their former formula, giving it only a more proper name.

Both these compositions are of considerable use for the purposes expressed in the title: the orange juice is an excellent assistant to the scurvy-grass and other acrid antiscorbutics; which, when thus mixed, have been found from experience to produce much better effects than when employed by themselves. These juices may be taken from an ounce or two to a quarter of a pint, two or three times a-day: they generally increase the urinary secretion, and sometimes induce a laxative habit. Preserved with the cautions above-mentioned, they will keep good for a considerable time; though, whatever care be taken, they are found to answer better when fresh; and from the difficulty of preserving them so, they have of late been very much laid aside, especially since we have been provided with more convenient and useful remedies.

INSPISSATED JUICES.

When vegetable juices, or watery or spirituous decoctions or infusions, are exposed to a continued heat, the fluid gradually evaporating, carries off with it such volatile matters as it was impregnated with, and leaves the more fixed united together into one mass. The mass which remains from the evaporation of the expressed juice of a plant is called *inspissated juice*; from watery decoctions or infusions, an *extract*; from spirituous tinctures, a *resin*, or *essential extract*. The term *extract* is frequently used also as a general appellation of all the three kinds. Inspissated juices and watery decoctions, particularly the former, when evaporated no further than to the consistence of oil or honey, are called *robs*; and spirituous tinctures, reduced to a like consistence, are called *balsams*.

What relates to the expression of juices has already been delivered, with the most effectual means of preserving them in their liquid state, and a general account of what substances do or do not give out their virtues with their juices. In the inspissation of juices, there is further to be considered the volatility or fixity of their medicinal parts: if a plant loses its virtue, or part of its virtue, in being dried, it is obvious that the juice must lose as much in being inspissated to dryness, how gentle soever the heat be with which the inspissation is performed. It is likewise to be observed, that the medicinal parts of some juices are kept in a state of perfect solution by the watery fluid, so as to be completely retained by it after the liquor has been made fine by settling, straining, or other means; while the medicinal parts of others, not dissoluble by watery menstrua, are only diffused through the liquor in the same manner as the feculencies are, and separate along with these on standing.

Inspissated juice of the elder-berry. L.

Take of expressed and depurated juice of elder-berries two pints; inspissate it in a water-bath, saturated with sea-salt.

Inspissated juice, commonly called *rob of elder-berries*. E.

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Take of juice of ripe elder-berries, five pounds; purest sugar, one pound. Evaporate with a gentle heat to the consistence of pretty thick honey.

This preparation, made with or without sugar, keeps well, and proves a medicine of considerable importance as an aperient, generally promoting the natural excretions by stool, urine, or sweat. The dose is from a dram or two to an ounce or more. A spoonful, diluted with water, is usually taken in common colds at bed-time.

Inspissated juice of wolfsbane. E.

Bruise the fresh leaves of aconitum; and including them in a hempen bag, strongly compress them in a press, so that they may give out their juice: let the juice be evaporated in open vessels in a water-bath, to the consistence of pretty thick honey: An empyreuma is to be avoided by constantly stirring the mixture towards the end of the process.

After the matter has become cold, let it be put up in glazed earthen vessels, and moistened with rectified spirit-of-wine.

In the same manner are prepared inspissated juices of belladonna or deadly nightshade, and hyoscyamus or henbane.

In these inspissated juices, the active parts of the plant are obtained in a concentrated state, and in a condition which admits of preparation for a considerable length of time. They furnish, therefore, a convenient form for exhibiting these articles which, in the practice of medicine, are perhaps more frequently used in the state of inspissated juice than any other. This is particularly the case with the hyoscyamus, which may often be advantageously employed when opium is indicated, but disagrees with the patient. But aconite and belladonna may in general, with greater advantage, be exhibited under the form of powder made from the dried leaves.

It is very remarkable that the London college have given no place to these articles. We cannot however help thinking, that their pharmacopœia would be enriched by introducing not only the articles themselves, but likewise these preparations, especially as they are not unfrequently prescribed by British practitioners.

Inspissated juice of hemlock. E.

Having expressed the juice of the leaves and stalks of hemlock when flowering, in the same manner as directed for that of the aconitum, evaporate it to the consistence of pretty thin honey; when it is cooled, add of the powder of the dried leaves of the plant as much as to make it into a mass fit for forming pills. Care, however, is to be taken, that the evaporation proceed only to such length, that as much of the powder can be mixed with the inspissated juice as shall make up about a fifth part of the whole mass.

A preparation similar to this was published at Vienna by Dr Stoerk, who recommends it as an efficacious resolvent in many obstinate disorders, where the common remedies avail nothing. He observes, that small doses should always be begun with, as two grains, made into a pill twice a-day; and that by gradually

R r increasing

increasing the dose, it may be given to two, three, or even four drams a day, and continued in such quantities for several weeks: that it may be used in safety in infancy, old age, and pregnancy: that it neither accelerates nor disturbs the circulation; neither heats, nor cools, nor affects the animal functions: that it increases the secretions, and renders the mouth moist; seldom purges; very rarely vomits; sometimes augments perspiration; often produces a copious discharge of viscid urine; but in many patients does not increase any of the useful evacuations: that it removes obstructions and their consequences; relieves rheumatic pains, though of long continuance; dissolves scirrhus tumors, both internal and external; and cures dropsies and consumptions proceeding from scirrhus: that it often dissolves cataracts, or stops their progress, and has sometimes removed the gutta serena: that inveterate cutaneous eruptions, scald heads, malignant ulcers, cancers, the malignant fluor albus and gonorrhoea of long standing, obstinate remains of the venereal disease, and caries of the bones, generally yield to it: that for the most part it is necessary to continue this medicine for a considerable time before the cure be effected, or much benefit perceived from it: that in some cases it failed of giving any relief; that he met with some persons who could not bear its effects; and that consequently there must be some latent difference in the habit, the diagnostic signs of which are at present unknown: that though it is by no means infallible any more than other medicines, yet the great number of deplorable cases that have been happily cured by it, is sufficient to recommend it to further trials. The efficacy of this medicine is confirmed by many eminent practitioners abroad; though the trials hitherto made of it in this country have not been attended with much success. Somewhat, perhaps, may depend on the time of the plant's being gathered, and the manner of the preparation of the extract. Dr Stoerk himself takes notice of some mistakes committed in this respect: some have left the herb in a heap for several days, whence part of it withered, part rotted, and the juice became thick and mucilaginous; others have taken a very large quantity of the juice, and boiled it down in copper vessels with a great heat; by which means a strong fetor was diffused to a considerable distance, and the most efficacious parts dissipated: others, with officious care, have clarified the juice, and thus obtained a black tenacious extract, retaining but a small degree of the specific smell of the plant. The extract, duly prepared, according to the above prescription, is of a greenish brown colour, and a very disagreeable smell, like that of mice. But though there be reason to believe that much of the extract used here had been ill prepared, we can by no means admit that its general inefficacy was owing to this cause; for though there are not many instances of its discovering any valuable medicinal powers, there are several of its having activity enough, even in small doses, to produce alarming symptoms.

Modern practice, however, seems to hold a middle place; being neither influenced by the extravagant encomiums of Dr Stoerk, nor frightened by the wary suspicions of Dr Lewis. The inspissated juice of the

variety of complaints, without our experiencing the wonderful effects ascribed to it by the former, or the baneful consequences dreaded by the latter. Like other preparations of this valuable herb, it is no doubt a very useful addition to our pharmacopoeia; nor does its use seem to be more hazardous than that of opium and some other narcotics.

The London college direct the inspissated juice of cicuta to be prepared in the same manner as that of the elder-berry, and without the addition of any of the powder. This is the most pure extract; and the powder may easily be occasionally added. They direct the cicuta to be collected as soon as the flowers appear: And at that time the leaves are most fully impregnated with their active powers.

Inspsissated juice of black currants. L.

Inspsissated juice of lemons. L.

These two the London college also direct to be prepared in the same manner with the elder-berry juice. And under this form the agreeable and useful acid of these vegetables, in a concentrated state, may be preserved for a considerable length of time.

CHAP. IV. *Extracts and Resins.*

Observations on Extracts with Water.

These extracts are prepared by boiling the subject in water, and evaporating the strained decoction to a thick consistence.

This process affords us some of the more active parts of the plants, free from the useless indissoluble earthy matter, which makes the largest share of their bulk. There is a great difference in vegetable substances, with regard to their fitness for this operation; some yielding to it all its virtues, and others scarce any. Those parts in which the sweet, glutinous, emollient, cooling, bitter, austere, astringent virtues reside, are for the most part totally extracted by the boiling water, and remain almost entire on evaporating it: whilst those which contain the peculiar odour, flavour, and aromatic quality, are either not extracted at all, or exhale along with the menstruum. Thus gentian root, which is almost simply bitter, yields an extract possessing in a small volume the whole taste and virtues of the root.—Wormwood, which has a degree of warmth and strong flavour joined to the bitter, loses the two first in the evaporation, and gives an extract not greatly different from the foregoing: the aromatic quality of cinnamon is dissipated by this treatment, its astringency remaining; while an extract made from the flowers of lavender and rosemary discovers nothing either of the taste, smell, or virtues of the flowers.

General Rules for making Extracts with Water.

1. It is indifferent, with regard to the medicine, whether the subject be used fresh or dry; since nothing that can be preferred in this process will be lost by drying. With regard to the facility of extraction, there is a very considerable difference; vegetables in general giving out their virtues more readily when moderately dried than when fresh.

2. Very

2. Very compact dry substances should be reduced into exceeding small parts, previous to the affusion of the menstruum.

3. The quantity of water ought to be no greater than is necessary for extracting the virtues of the subject. A difference herein will sometimes occasion a variation in the quality of the product; the larger the quantity of liquor, the longer time will be requisite for evaporating it, and consequently the more volatile parts of the subject will be dissipated. A long-continued heat likewise makes a considerable alteration in the matter which is not volatile. Sweet substances, by long boiling with water, become nauseous; and the drastic purgatives lose their virulence, though without any remarkable separation of their parts.

4. The decoctions are to be depurated by colature; and afterwards suffered to stand for a day or two, when a considerable quantity of sediment is usually found at the bottom. If the liquor poured off clear be boiled down a little, and afterwards suffered to cool again, it will deposit a fresh sediment, from which it may be decanted before you proceed to finish the evaporation. The decoctions of very resinous substances do not require this treatment, and are rather injured by it; the resin subsiding along with the inactive dregs.

5. The evaporation is most conveniently performed in broad shallow vessels; the larger the surface of the liquor, the sooner will the aqueous parts exhale: This effect may likewise be promoted by agitation.

6. When the matter begins to grow thick, great care is necessary to prevent its burning. This accident, almost unavoidable if the quantity be large, and the fire applied as usual under the evaporating pan, may be effectually provided against, by carrying on the inspissation after the common manner, no farther than to the consistence of a syrup, when the matter is to be poured into shallow tin or earthen pans, and placed in an oven, with its door open, moderately heated; which acting uniformly on every part of the liquid, will soon reduce it to any degree of consistence required. This may likewise be more securely done, by setting the evaporating vessel in boiling water, but the evaporation is in this way very tedious.

Observations on Extracts with Rectified Spirit.

Rectified spirit of wine dissolves the essential oils and resins of vegetables, and does not readily carry off the oil in its exhalation; the heat sufficient to exhale pure spirit being much less than that in which water evaporates to any considerable degree, or most essential oils distil. Hence a resinous or spirituous extract of wormwood, contrary to that made with water, contains the warmth and flavour, as well as bitterness, of the herb; one made from cinnamon possesses its aromatic virtue, as well as its astringency; and one from lavender and rosemary flowers, retains great part of their flavour and virtues; the volatile parts, which are carried off by water in its evaporation, being left behind by the spirit.

The spirit employed for this purpose should be perfectly free from any ill flavour, which would be communicated in part to the preparation; and from any admixture of phlegm or water, which would not only

vary its dissolving power, but likewise, evaporating towards the end of the inspissation, would promote the dissipation of the volatile parts of the subject. Hence, also, the subject itself ought always to be dry; those substances which lose their virtue by drying, lose it equally on being submitted to this treatment with the purest spirit.

The inspissation should be performed from the beginning, in the gentle heat of a water bath. It is not needful to suffer the spirit to evaporate in the air: greatest part of it may be recovered by collecting the vapour in common distilling vessels. If the distilled spirit be found to have brought over any flavour from the subject, it may be advantageously reserved for the same purposes again.

It is observable, that though rectified spirit be the proper menstruum of the pure volatile oils, and of the grosser resinous matter of vegetables, and water of the mucilaginous and saline; yet these principles are, in almost all plants, so intimately combined together, that whichever of these liquors is applied at first, it will take up a portion of what is directly soluble only in the other. Hence sundry vegetables, extremely resinous, and whose virtues consist chiefly in their resin, afford nevertheless very useful extracts with water, though not equal to those which may be obtained by a prudent application of spirit. Hence also the extracts made from most vegetables by pure spirit, are not mere resins; a part of the gummy matter, if the subject contained any such, is taken up along with the resin; an admixture of great advantage to it in a medicinal view. The spirituous extracts of several vegetable substances, as mint leaves, rhubarb, saffron, dissolve in water as well as in spirit.

Pure resins are prepared by mixing, with spirituous tincture of very resinous vegetables, a quantity of water. The resin, incapable of remaining dissolved in the watery liquor, separates and falls to the bottom; leaving in the menstruum such other principles of the plant as the spirit might have extracted at first along with it.

Observations on Extracts with Spirit and Water.

There are sundry vegetables, particularly those of a resinous nature, which are treated to better advantage with a mixture of water and spirit, than with either of them singly. The virtues of resinous woods, barks, and roots, may indeed be in great part extracted by long boiling in fresh portions of water; but at the same time they suffer a considerable injury from the continued heat necessary for the extraction, and for the subsequent evaporation of so large a quantity of the fluid. Rectified spirit of wine is not liable to this inconvenience; but the extracts obtained by it from the substances here intended, being almost purely resinous, are less adapted to general use than those in which the resin is divided by an admixture of the gummy matter, of which water is the direct menstruum.

There are two ways of obtaining these compound or gummy-resinous extracts: one, by using pure spirit, that is, a mixture of about equal parts of spirit and water, for the menstruum; the other, by digesting the subject first in pure spirit and then in water, and afterwards uniting into one mass the parts which

the two menstrua have separately extracted. In some cases, where a sufficiency of gummy matter is wanting in the subject, it may be artificially supplied, by inspissating the spirituous tincture to the consistence of a balsam, then thoroughly mixing with it a thick solution of any simple gum, as mucilage of gum-arabic, and drying the compound with a gentle heat. By this method are obtained elegant gummy-resins, extemporaneously miscible with water into milky liquors.

Observations on extracts by long digestion.

- 132 It has been observed, that the virtues of vegetable decoctions are altered by long boiling. Decoctions or infusions of drastic vegetables, by long continued boiling or digestion, lose more and more of their virulence; and at the same time deposit more and more of a gross sediment, resulting probably from the decomposition of their active parts. On this foundation it has been attempted to obtain safe and mild preparations from sundry virulent drugs; and some of the chemists have strongly recommended the process, though without specifying, or giving any intimation of, the continuance of boiling requisite for producing the due mildness in different subjects. M. Beaumé, in his *Elémens de Pharmacie*, lately published, has given a particular account of an extract of opium prepared on this principle; of which extract, as it is alleged to be very useful in practice, it may not be improper to give a short description: And this we shall accordingly subjoin to our account of the opium purificatum of the London college.

Observations on particular extracts.

- 133 *Extract of chamomile,*
broom tops,
gentian,
liquorice,
blackhellebore,
rue,
savin. L.

Boil the article in distilled water, press out the decoction, strain it, and set it apart that the feces may subside; then boil it again in a water-bath saturated with sea-salt to a consistence proper for making pills.

The same kind of bath is to be used in the preparation of all the extracts, that the evaporation may be properly performed.

Extract of gentian. E.

- 134 Take of gentian root as much as you please. Having cut and bruised it, pour upon it four times its quantity of water. Boil to the consumption of one half of the liquor; and strongly expressing it, strain. Evaporate the decoction to the consistence of thick honey in vessels exposed to the vapour of hot water.

In preparing this and every other extract, it is necessary to keep up a constant stirring towards the end of the process, in order to prevent an empyreuma, and that the extract may be of an uniform consistence, and free of clots.

In the same manner are prepared,

Extract of the roots of black hellebore;
leaves of the pulsatilla nigricans;
leaves of rue;
leaves of white poppies;
imperfectly ripe seeds of hemlock.

All the above extracts contain the virtues of the vegetable in a state of tolerable perfection.

The extract of chamomile loses in its formation the specific flavour of the plant; but it is said to furnish a bitter remarkably antiseptic, and to be given with advantage in different stomach ailments to the extent of a scruple or two, either by itself, or in conjunction with other remedies. The extract of broom tops is chiefly employed in hydropic cases; and when taken to the quantity of about a dram, is said to operate as a powerful diuretic.

The mode of preparing these extracts directed by the London and Edinburgh colleges is not essentially different: but some advantage will arise from employing the distilled water directed by the former; and the directions given by the latter with regard to the quantity of water to be used, and the degree of boiling to be employed before expression, are not without some use.

The extract is the only preparation of the pulsatilla nigricans, and it seems sufficiently well suited to be brought into this form. The extract of the white poppy-heads is not perhaps superior in any respect to opium; but to those who may think otherwise, it is convenient to preserve them in this form for preparing the syrup occasionally. The seeds of hemlock have by some been thought stronger, or at least that they produce giddiness sooner, than the leaves; but this extract has not hitherto come into general use.

Compound extract of coloquintida. L.

Take of pith of coloquintida, cut small, six drams; fœcotorine aloes, powdered, an ounce and a half; scammony, powdered, half an ounce; smaller cardamon seeds, husked and powdered, one dram; proof spirit, one pint. Digest the coloquintida in the spirit, with a gentle heat, during four days. To the expressed tincture add the aloes and scammony: when these are dissolved, distil off the spirit, so that what remains may be of a consistence proper for making pills, adding the seeds towards the end of the process.

This composition answers very effectually as a cathartic, so as to be relied on in cases where the patient's life depends on that effect taking place: the dose is from fifteen grains to half a dram. The proof spirit is a very proper menstruum for the purgative materials; dissolving nearly the whole substance of the aloes and scammony, except the impurities; and extracting from the colocynth, not only the irritating resin, but great part of the gummy matter. In the former pharmacopœias three spices were employed in this composition, cinnamon, mace, and cloves: the cardamon seeds, now introduced, are preferable, on account of their aromatic matter being of a less volatile nature; though a considerable part of the flavour, even of these, is dissipated during the evaporation of the phlegmatic part of the proof-spirit.

Elaterium. L.

Slit ripe wild cucumbers, and pass the juice, very lightly 136]

lightly pressed, through a fine hair sieve, into a glass vessel; then set it by for some hours until the thicker part has subsided. Pour off the thinner part swimming at the top, and separate the rest by filtering: cover the thicker part, which remains after filtration, with a linen cloth, and dry it with a gentle heat.

What happens in part in preparing the extract of hemlock, happens in this preparation completely, viz. the spontaneous separation of the medicinal matter of the juice on standing for a little time: and the case is the same with the juices of several other vegetables, as those of arum root, iris root, and bryony root. Preparations of this kind have been commonly called *fecule*. The filtration above directed, for draining off such part of the watery fluid as cannot be separated by decantation, is not the common filtration through paper, for this does not succeed here: the grosser parts of the juice, falling to the bottom, form a viscid cake upon the paper, which the liquid cannot pass through. The separation is to be attempted in another manner, so as to drain the fluid from the top: this is effected by placing one end of some moistened strips of woollen cloth, skains of cotton, or the like, in the juice, and laying the other end over the edge of the vessel, so as to hang down lower than the surface of the liquor: by this management the separation succeeds in perfection.

Elaterium is a very violent hydragogue cathartic. In general, previous to its operation, it excites considerable sickness at the stomach, and not unfrequently it produces severe vomiting. Hence it is seldom employed till other remedies have been tried in vain. But in some instances of ascites it will produce a complete evacuation of water where other cathartics have had no effect. Two or three grains are in general a sufficient dose. And perhaps the best mode of exhibiting it is by giving it only to the extent of half a grain at a time, and repeating that dose every hour till it begins to operate.

Extract of logwood. L.

Take of shavings of logwood, one pound. Boil it four times, or oftener, in a gallon of distilled water, to one half; then, all the liquors being mixed and strained, boil them down to a proper consistence.

The extract of logwood has been used for a considerable time in some of our hospitals. It has an agreeable sweet taste, with some degree of astringency; and hence becomes serviceable in diarrhoeas, for moderately constringing the intestines and orifices of the smaller vessels: it may be given from a scruple to half a dram, and repeated five or six times a-day with advantage. During the use of this medicine, the stools are frequently tinged red by it, which has occasioned some to be alarmed as if the colour proceeded from blood: the practitioner therefore ought to caution the patient against any surprise of this kind.

The active parts of the logwood are difficultly extracted by means of water alone: hence the Edinburgh college call in the aid of spirit of wine, directing this extract to be prepared in the same manner as that of jalap, afterwards to be mentioned. And of the two moles, we are inclined to consider the latter as intitled to the preference.

Extract of Peruvian bark. L.

Take of Peruvian bark, coarsely powdered, one pound; distilled water, 12 pints. Boil it for one or two hours, and pour off the liquor, which, while hot, will be red and pellucid; but, as it grows cold, will become yellow and turbid. The same quantity of water being again poured on, boil the bark as before, and repeat this boiling until the liquor, being cold, remains clear. Then reduce all these liquors, mixed together and strained, to a proper thickness, by evaporation.

This extract must be prepared under two forms; one *soft*, and fit for making pills; the other *hard*, that it may be reducible to a powder.

Extract of Peruvian bark with the resin. L.

Take of Peruvian bark, reduced to coarse powder, one pound; rectified spirit of wine, four pints. Digest it for four days, and pour off the tincture; boil the residuum in 10 pints of distilled water to two; then strain the tincture and decoction separately, evaporating the water from the decoction, and distilling off the spirit from the tincture, until each begins to be thickened. Lastly, mix the resinous with the aqueous extract, and make the mass fit for forming into pills.

Extract of Peruvian bark. E.

The Edinburgh college, who have not given a place to any pure watery extract of the bark, direct their extract of this medicine to be prepared in the same manner as their extract of jalap, that is, almost precisely in the same manner as the extract with resin of the London college. It is, however, we think with propriety, that the London college have given a place to both extracts; for neither is without its use.

Peruvian bark is a resinous drug; the resin melts out by the heat, but is not perfectly dissolved by the water: hence, in cooling, it separates, renders the liquor turbid, and in part falls to the bottom, as appears manifestly upon examining the sediment by spirit of wine. This extract might be made to better advantage by the assistance of spirit of wine, after the same manner as that of jalap; and this method the Edinburgh college have directed. But all the spirits which can be expected to be employed for this process among us, are accompanied with some degree of bad flavour: this adheres most strongly to the phlegmatic part of the spirit, which evaporating last, must communicate this ill flavour to the extract; a circumstance of very great consequence, as this medicine is designed for those whose stomachs are too weak to bear a due quantity of bark in substance. Ten or twelve grains of the hard extract are reckoned equivalent to about half a dram of the bark itself.

In the Peruvian bark, however, we may readily distinguish two different kinds of tastes, an astringent and a bitter one: the former seems to reside principally in the resinous matter, and the latter chiefly in the gummy. The watery extract is moderately strong in point of bitterness, but of the astringency it has only a small degree. The pure resin, on the other hand, is strong in astringency, and weak in bitterness. Both qualities

are united in the extract with the resin; which appears to be the best preparation of this kind that can be obtained from this valuable drug.

Extract of cascarilla. L.

- 141 This extract, which is now for the first time introduced into the pharmacopœia of the London college, and which has not yet obtained a place in that of Edinburgh, is directed to be prepared by spirit and water in the same manner as the extract of bark with the resin. It possesses, in a concentrated state, the active constituent parts of the cascarilla, and has accordingly been already received into several of the best foreign pharmacopœias. In some of these, as the Pharmacopœia Suecica, it is a mere watery extract: but in others, as the Pharmacopœia Rossica, the aid both of spirits and water are conjoined; and this we consider as the best preparation.

Extract of jalap. E.

- 142 Take of jalap root one pound; rectified spirit of wine, four pounds. Digest four days, and pour out the tincture. Boil the remaining magma in ten pounds of water to two pounds; then strain the decoction, and evaporate it to the consistence of pretty thin honey. Draw off the spirit from the tincture by distillation till what remains becomes thick. Then mix the liquors thus inspissated; and keeping them constantly stirring, evaporate to a proper consistence.

The extract of jalap is directed to be prepared by the London college in the same manner as their extract of Peruvian bark with the resin, which differs in nothing from the mode of preparation above directed.

This extract is an useful purgative; by some thought preferable to the crude root, as being of more uniform strength, and as the dose, by the rejection of the woody parts, is rendered smaller: the mean dose is 12 grains. If the spirituous tincture were inspissated by itself, it would afford a resinous mass, which, unless thoroughly divided by proper admixtures, occasions violent griping, and yet does not prove sufficiently cathartic; the watery decoctions yield an extract which operates very weakly: both joined together, as in this preparation, compose an effectual and safe purge. This method of making extracts might be advantageously applied to several other resinous substances, as the dry woods, roots, barks, &c. A small quantity of spirit takes up the resin; and much less water than would otherwise be necessary, extracts all the other soluble parts.

In a former edition of the Edinburgh Pharmacopœia, a little fixed alkaline salt was ordered to be added to the water in which the jalap is boiled after the action of spirit; on a supposition that this would enable the water to extract more from the root than it could by itself. But, so far as the quantity of the alkaline salt could go, it had the opposite effect, impeding the action of the water. The resinous parts of the jalap are dissolved by the spirit; and little other than the gummy matter remains for water to extract. Now, if pure gum arabic be put into water along with any alkaline salt, the salt will render the water incapable of dissolving the gum: if the gum be dissolved

first, the addition of any alkaline salt will precipitate it.

Extract of senna. L.

Take of senna, one pound; distilled water, one gallon. Boil the senna in the distilled water, adding after its decoction a little rectified spirit of wine. Evaporate the strained liquor to a proper thickness.

This extract had no place in our former pharmacopœias, but may be considered as an useful addition.

The resinous parts of senna are in so small a proportion to the gummy, that they are readily boiled out together. The spirit may be added when the decoction is reduced to one half or to three pints.

This extract is given as a gentle purgative from 10 grains to a scruple; or, in less quantity, as an assistant to the milder laxatives.

Purified opium. L.

Take of opium, cut into small pieces, one pound; proof-spirit of wine, 12 pints. Digest the opium with a gentle heat, stirring now and then till it be dissolved, and filter through paper. Distil the tincture, so prepared, to a proper thickness.

Purified opium must be kept in two forms; one *soft*, proper for forming into pills; the other *hard*, which may be reduced into powder.

Opium was formerly purified by means of water; and in this state it had the name in our pharmacopœia of *extractum thebaicum*. But proof-spirit has been found, by experiments, to be the best menstruum for opium, having dissolved three-fourths of dried opium, which was much more than was taken up either by rectified spirit or water. Hence we thus obtained most entirely the constituents of opium free from any adhering impurities: but it has been imagined that some particular advantages arise from the parts which are extracted by water, especially after long digestion; and accordingly the following extract of opium has been recommended by Mr Beaumé.

Extract of opium prepared by long digestion.

Let five pounds of good opium, cut in pieces, be boiled about half an hour, in 12 or 15 quarts of water: strain the decoction, and boil the remainder once or twice in fresh water, that so much of the opium as is dissoluble in water may be got out. Evaporate the strained decoctions to about six quarts; which being put into a tin cucurbit, placed in a sand-bath, keep up such a fire as may make the liquor nearly boil, for three months together if the fire is continued day and night, and for six months if it is intermitted in the night; filling up the vessel with water in proportion to the evaporation, and scraping the bottom with a wooden spatula from time to time, to get off the sediment which begins to precipitate after some days digestion. The sediment needs not to be taken out till the boiling is finished; at which time the liquor is to be strained when cold, and evaporated to an extract of a due consistence for being formed into pills.

The author observes, that by keeping the liquor strongly boiling, the tedious process may be considerably expedited, and the six months digestion reduced

to four months: that in the beginning of the digestion, a thick, viscous, oily matter rises to the top, and forms a tenacious skin as the liquor cools; this is supposed to be an locus to essential oils, though wanting their volatility: that the oil begins to disappear about the end of the first month, but still continues sensible till the end of the third, forming oily clouds as often as the liquid cools: that the resin at the same time settles to the bottom in cooling, preserving for a long while its resinous form, but by degrees becoming powdery, and incapable of being any longer softened, or made to cohere by the heat: that when the process is finished, part of it still continues a perfect resin, dissoluble in spirit of wine, and part an indissoluble powder: that when the digested liquor is evaporated to about a quart, and set in the cold till next day, it yields a brownish earthy saline matter, called the *essential salt of opium*, in figure nearly like the sedative salt obtained from borax, intermingled with small needle crystals. He gives an account of his having made this preparation six or seven times. The vessel he made use of was about two inches and a half diameter in the mouth: the quantity of water evaporated was about 24 ounces a day, and from 120 to 140 quarts during the whole digestion. Out of 64 ounces of opium, 17 ounces remained undissolved in the water; the quantity of resinous matter precipitated during the digestion, was 12 ounces: from the liquor, evaporated to a quart, he obtained a dram of essential salt, and might, he says, have separated more; the liquor being then further evaporated to a pilular consistence, the weight of the extract was 31 ounces.

It is supposed that the narcotic virtue of opium resides in the oily and resinous parts; and that the gummy extract, prepared by the above process, is endowed with the calming, sedative, or anodyne powers of the opium, divested of the narcotic quality as it is of the smell, and no longer productive of the disorders which opium itself, and the other preparations of it, frequently occasion. A case is mentioned, from which the innocence and mildness of the medicine are apparent; 50 grains having been taken in a day, and found to agree well, where the common opiate preparations could not be borne. But what share it possesses of the proper virtues of opium is not so clear; for the cure of convulsive motions of the stomach and vomitings, which at length happened after the extract had been continued daily in the above doses for several years (*plusieurs années*), cannot perhaps be ascribed fairly to the medicine.

If the theory of the process, and of the alteration produced by it in the opium, be just, a preparation equivalent to the above may be obtained in a much shorter time. If the intention is to separate the resinous and oily parts of opium, they may be separated by means of pure spirit of wine, in as many hours as the digestion requires months. The separation will also be as complete, in regard to the remaining gum, tho' some part of the gum will in this method be lost, a little of it being taken up by the spirit along with the other principles.

In what particular part of opium its peculiar virtues reside, has not perhaps been incontestably ascertained; but this much seems clear from experiment, that the pure gum, freed from all that spirit can dissolve, does

not differ essentially in its soporific power from the resinous part.

There are grounds also to presume, that by whatever means we destroy or diminish what is called the *narcotic, soporific, violent quality of opium*, we shall destroy or diminish likewise its salutary operation. For the ill effects which it produces in certain cases, seem to be no other than the necessary consequences of the same power, by which it proves so beneficial in others.

Extract of wormwood. Succ.

Take any quantity of the tops of wormwood, and pour upon it double its weight of water. Boil it for a short time over a gentle fire, then press out the liquor. Boil the residuum again in a fresh quantity of water, and after expression, strain it. Let the strained liquor be evaporated in a water-bath to a proper consistence.

In this extract we have one of the strongest vegetable bitters in its most concentrated state: and though it is not perhaps to be considered as superior to the extract of gentian, yet it furnishes a good variety, and is a more agreeable form for exhibiting the wormwood than that of strong tincture.

Extract of dandelion. Succ.

This is directed to be prepared from the roots of the dandelion, collected early in the spring, or late in the autumn, in the same manner as the extractum absinthii. And as far as the dandelion really possesses a resolvent, aperient, or diuretic power, it furnishes a convenient form for obtaining these effects from it. But as the dandelion is well known to abound with a milky juice, it is probable that the activity of the medicine would be increased from employing spirit also in the extraction of its medical virtues.

Watery extract of aloes. Succ.

Take of hepatic aloes one pound; cold spring water, four pounds; juice of citrons, one pound. Macerate them in a glass vessel for one or two days, shaking the vessel from time to time. When the resinous and feculent parts have subsided, pour off the liquor; and to the residuum add fresh water, till by this treatment it obtains a little impregnation. Let the strained liquors be then evaporated in a warm bath to the consistence of honey.

Although aloes are perhaps upon the whole a better medicine, in their crude state, where the gummy and resinous matters are united, than in those preparations where either is retained separately, yet the gummy extract which is thus obtained is at least less disagreeable, having little smell or taste, while at the same time it is a very powerful purgative: hence it may be usefully employed at least on some occasions.

Gummy extract of myrrh. Brun.

Take of myrrh, half a pound; spring-water, four pounds. Let the myrrh be dissolved by gentle digestion and repeated agitation of the vessel for four or five days: let the water swimming above the myrrh be then poured off, strained, and evaporated to the consistence of an extract.

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This watery extract of myrrh may be useful in some cases, as being much deprived of the heating qualities which it has in its crude state: and if it furnishes us in phthisis pulmonalis with that useful remedy which some imagine, it may probably be most advantageously exhibited under this form.

Refined liquorice. Dan.

150 Take any quantity of Spanish liquorice, cut it into small fragments, dissolve it in tepid water, and strain the solution. Let the liquor be poured off from the feculent part after it has subsided, and inspissated by a gentle heat.

The extract of liquorice already mentioned, when it is prepared with due skill and attention, is unquestionably an article superior to this; but it is very rarely met with in the shops of our druggists or apothecaries as prepared by themselves. In its place they very commonly employ either the extract brought from Spain, or that prepared by the makers of liquorice at home; both of which very commonly abound with impurities. It has even been said, that a portion of sand is not unfrequently mixed with it to increase the weight: but whether the impurities arose from this cause, or from the slovenly mode of preparing it, considerable advantage must arise from freeing it from all these before it be employed for any purpose in medicine. And in modern practice it is frequently used, not only in troches and pills, but also for suspending powders in waters; such as the powder of Peruvian bark: and the powder of bark, when thus suspended, is in general taken more readily by children than in any other form. Hence considerable advantage must arise from a proper and easy mode of purifying it, which the above process affords. We are of opinion, therefore, that although a place be with propriety given to the extract of liquorice prepared by the apothecaries themselves, refined liquorice ought also to be introduced into our pharmacopœias; and it would be very convenient to keep it in the shops in a soft consistence fit for making pills, as it would not only answer that purpose, but admit of a ready solution in water when requisite. To this consistence, indeed, an objection occurs, from its being apt to grow mouldy; but this may be effectually prevented by the addition of a small proportion of spirit.

Besides the extracts which we have here selected from the foreign pharmacopœias, many others also still retain a place in several of these; such, for example, as the *extractum arnicæ, artemisise, bryoniæ, cardui, centaurei, cochleariæ, croci*, &c. Several of these had formerly a place in our pharmacopœias, but are now with propriety rejected; because, where these substances are to be employed, they may with much more advantage be exhibited under other forms. And, indeed, although under the form of extract we have a condensation of some active principles, yet by the action of fire others are very apt to be lost. Hence, where any article can be conveniently exhibited in substance, that form is in general preferable; and recourse should be had to extracts only with a view to some particular intention. Our colleges therefore have with propriety diminished the number of them; and even those which they have adopted are but seldom to be had recourse to in preference to other forms. In the formation of many of

those extracts, retained by the foreign colleges, the most valuable principles are either entirely dissipated or destroyed by the fire. We think, however, that advantage may sometimes be obtained from adopting these which are here selected.

The chapter on extracts and resins in the London pharmacopœia is concluded with the two following general directions:

1. All the extracts, during the time of inspissation, must be gently agitated.
2. On all the softer watery extracts, a small quantity of spirit of wine must be sprinkled.

CHAP. V. *Expressed Oils.*

EXPRESSED oils are obtained chiefly from certain seeds and kernels of fruits, by thoroughly pounding them in a stone mortar, or, where the quantities are large, grinding them in mills, and then including them in a canvas bag, which is wrapt in a hair-cloth, and strongly pressed between iron plates. The canvas, if employed alone, would be squeezed so close to the plates of the press as to prevent the oil from running down: by the interposition of the hair-cloth a free passage is allowed it.

Sundry machines have been contrived, both for grinding the subject and pressing out the oil, in the way of business. To facilitate the expression, it is usual to warm either the plates of the press, or the subject itself after the grinding, by keeping it stirring in a proper vessel over the fire; the oil, liquefied by the heat, separates more freely and more plentifully. When the oil is designed for medicinal purposes, this practice is not to be allowed; for heat, especially if its degree be sufficient to be of any considerable advantage for promoting the separation, renders the oil less soft and palatable, impresses a disagreeable flavour, and increases its disposition to grow rancid: hence the colleges both of London and Edinburgh expressly require the operation to be performed without heat.

Nor are the oils to be kept in a warm place after their expression. Exposed for a few days to a heat no greater than that of the human body, they lose their emollient quality, and become highly rancid and acrimonious. Too much care cannot be taken for preventing any tendency to this acrid irritating state in medicines, so often used for abating immoderate irritation.

So much are these oils disposed to this injurious alteration, that they frequently contract an acrimony and rancidity while contained in the original subjects. Hence great care is requisite in the choice of the unctuous seeds and kernels, which are often met with very rancid; almonds are particularly liable to inconveniences of this kind.

Expressed oils are prepared for mechanic uses from sundry different subjects, as nuts, poppy-seed, hemp-seed, rape-seed, and others. Those directed for medicinal purposes in the London and Edinburgh pharmacopœias are the following:

Oil of almonds. L. E.

Pound fresh almonds, either sweet or bitter, in a mortar, then press out the oil in a cold press.

para-
s and
apoli-
s.

In the same manner is to be expressed oil of linseed and oil of mustard-seed.

The oil of almonds is prepared from the sweet and bitter almonds indifferently, the oils obtained from both sorts being exactly the same. Nor are the differences of the other oils very considerable, the discriminating qualities of the subjects not residing in the oils that are thus obtained by expression. The oil of linseed requires indeed some peculiarities from containing a proportion of vegetable mucilage; but the oil of mustard-seed is as soft, insipid, and void of pungency, as that of sweet almonds, the pungency of the mustard remaining entire in the cake left after the expression. The several oils differ in some of their properties from each other; but in medicinal qualities they appear to be all nearly alike, and agree in one common emollient virtue. They soften and relax the solids, and obtund acrimonious humours; and thus become serviceable internally in pains, inflammations, heat of urine, hoarseness, tickling coughs, &c. in glysters, for lubricating the intestines, and promoting the ejection of indurated feces; and in external applications, for tension and rigidity of particular parts. Their common dose is half an ounce; in some cases they are given to the quantity of three or four ounces. The most commodious forms for their exhibition we shall see hereafter in the chapter of Emulsions.

Castor oil. L.

This oil is directed by the London college to be prepared in the same manner as that of almonds, the seeds or nuts being taken from the husks before putting them into the mortar. Palma Christi, or castor oil, (See *OLEUM Palmae Christi*, and *RICINUS*), is a gentle and useful purgative: it generally produces its effects without griping, and may be given with safety where acrid purgatives are improper. With adults, from half an ounce to an ounce is generally requisite for a dose. This article, however, is very seldom prepared by our apothecaries, being in general imported under the form of oil from the West Indies; hence the Edinburgh college have not mentioned it among their preparations, but merely given it a place in their list of the materia medica. But when our apothecaries prepare it for themselves, they are more certain of obtaining a pure oil, and one too obtained without the aid of heat, which is often employed, and gives a much inferior oil. It is therefore with propriety that the London college have given directions for the preparation of it by the apothecary himself. But even the London college have not thought it necessary to give directions for the preparation of the following expressed oils, which, as well as the *oleum ricini*, are also introduced into the list of the materia medica by the Edinburgh college.

*Expressed oil of bay berries,
mace,
olives,
palm.*

These also are principally considered as possessing only an emollient virtue; but as far as they have been supposed to exert any peculiar qualities, these we have

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had occasion to mention in other parts of the work, when treating of the articles from which they are obtained. See *OLEA*, *MACE*, &c.

Prepara-
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Composi-
tions

Oil of chocolate nuts. Succ.

Express the oil from the nuts slightly toasted, and freed from their coverings. 155

In this oil we have the nutritious part of chocolate, free from those aromatics with which it is united in the state in which it is kept in our shops. And although under the form of chocolate it sits perhaps more easily on the stomach than in most other forms; yet where, from any particular circumstance, aromatics are contraindicated, the oil in its pure state gives us an opportunity of employing in different ways this mild nutritious article.

Oil of hyoscyamus. Succ.

This oil is directed to be obtained by expression from the seeds of the hyoscyamus, in the same manner as that of almonds. 156

Of the narcotic powers of the hyoscyamus some observations have already been offered. This oil, although an expressed one, is said to retain these virtues; and accordingly it has entered the composition of some anodyne ointments and plasters. We are, however, inclined to think, that when the sedative power of hyoscyamus is wanted under the form of oil, it may be best obtained from impregnating olive oil by the leaves of the plant.

Egg oil. Succ.

Take any quantity of fresh eggs, boil them till they be quite hard; then take out the yolks, break them in pieces, and roast them gently in a frying-pan till they feel greasy when pressed between the fingers; put them while warm into a hair-bag, and express the oil. 157

The yolk of the egg is well known to be a mild nutritious substance: but notwithstanding the many virtues at one time attributed to it, of being paregoric and styptic, as externally applied; and of being useful in stomach complaints, dysentery, and different affections of the alimentary canal, when taken internally;—it is much to be doubted whether it be in any other way useful in medicine than as an article of diet; and we are very uncertain whether any particular purpose in medicine will be answered by this expressed oil: but as it holds a place in most of the foreign pharmacopœias of modern date, it may justly be considered as deserving some attention.

Notwithstanding the justice of the observation respecting the great similarity of expressed oils in general, yet there can be no doubt that in some instances they obtain a peculiar impregnation. This manifestly appears in the *oleum ricini*, *oleum nucis mescatae*, and some of the others mentioned above. Indeed oils expressed from aromatic substances in general retain some admixture of the essential oil of the subject from which they are expressed. Nor is this surprising, when we consider that in some cases the essential oil exists in a separate state even in the growing plant.

The rinds of the several varieties of oranges, lemons, and citrons, yield by a kind of expression their essential

S f oils

oils almost pure, and nearly similar to those which are obtained from them by distillation. The essential oils, in which the fragrance and aromatic warmth of these fruits reside, are contained in numerous little vesicles, which may be distinguished by the naked eye, spread all over the surface of the peel. If the rind be cut in slices, and the slices separately doubled or bent in different parts, and squeezed between the fingers, the vesicles burst at the bending, and discharge the oil in a number of fine slender jets. A glass plate being set upright in a glass or porcelain vessel, and the slices squeezed against the plates, the little jets unite into drops upon the plate, and trickle down into the vessel beneath. But though this process affords the true native oil in the same state wherein it existed in the subject, unaltered by fire or other agents, it is not practicable to advantage unless where the fruit is very plentiful, as only a small part of the oil it contains can thus be extracted or collected.

The oil is more perfectly separated by rubbing the rind upon a lump of sugar. The sugar, by the inequality of its surface, produces the effect of a rasp in tearing open the oily vesicles, and in proportion as the vesicles are opened the sugar imbibes the oil. When the outward part of the lump is sufficiently moistened, it is scraped off, and the operation continued on the fresh surface. The oil thus combined with the sugar is fit for most of the uses to which it is applied in a fluid state. Indeed the pure essential oils obtained by distillation are often purposely mixed with sugar to render their use the more commodious.

CHAP. VI. *Essential Oils.*

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ESSENTIAL oils are obtained only from odoriferous substances; but not equally from all of this class, nor in quantity proportional to their degree of odour. Some which, if we were to reason from analogy, should seem very well fitted for this process, yield extremely little oil, and others none at all. Roses and camomile flowers, whose strong and lasting smell promises abundance, are found upon experiment to contain but a small quantity; the violet and jessamine flower, which perfume the air with their odour, lose their smell upon the gentlest coction, and do not afford the least perceptible mark of oil on being distilled unless immense quantities are submitted to the operation at once; while safin, whose disagreeable scent extends to no great distance, gives out the largest proportion of oil of almost any vegetable known.

Nor are the same plants equally fit for this operation when produced in different soils or seasons, or at different times of their growth. Some yield more oil if gathered when the flowers begin to fall off than at any other time. Of this we have examples in lavender and rue; others, as sage, afford the largest quantity when young, before they have sent forth any flowers; and others, as thyme, when the flowers have just appeared. All fragrant herbs yield a larger proportion of oil when produced in dry soils and warm summers than in opposite circumstances. On the other hand, some of the disagreeable strong-scented ones, as wormwood, are said to contain most in rainy seasons and when growing in moist rich grounds.

Several of the chemists have been of opinion, that

herbs and flowers, moderately dried, yield a greater quantity of essential oil than if they were distilled when fresh. It is supposed, that the oil being already blended, in fresh plants, with a watery fluid, great part of it remains diffused through the water after the distillation, divided into particles too minute to unite and be collected; whereas in drying, the oily parts, on the exhalation of the moisture which kept them divided and dispersed, run together into globules, which have little disposition to mingle with watery fluids, and easily separate from the water employed in the distillation.

This theory, however, does not appear to be quite satisfactory; for though the oil be collected in the subject into distinct globules, it does not rise in that form, but is resolved into vapour, and blended and coagitated by the heat with the vapour of the water; and if the oil in a dry plant was less disposed to unite with aqueous fluids than in a fresh one, the dry ought to yield a weaker infusion than the fresh; the contrary of which is generally found to obtain. As the oil of the dry plant is most perfectly extracted and kept dissolved by the water before the distillation, it is difficult to conceive any reason why it should have a greater tendency to separate from the water afterwards.

The opinion of dry plants yielding most oil seems to have arisen from an observation of Hoffman, which has probably been misunderstood: "A pound (he says) of dry spike flowers yields an ounce of oil, but if they were distilled fresh they would scarcely yield above half an ounce; and the case is the same in balm, sage, &c. The reason is, that in drying the watery humidity exhales; and as from two pounds of a fresh plant we do not obtain above one pound of dry, and little of the subtle oil evaporates in the drying, it follows, that more oil ought to be afforded by the dry than by the fresh." The meaning of which seems to be no more than this, that if two pounds of a fresh plant are by drying reduced to one without any loss of the oil, then the one pound dry ought to be equivalent to the two fresh. A late writer quotes an experiment of Neumann, which appears to be misunderstood in the same manner; for Neumann, in the place referred to, says only that dry wormwood is found to yield much more oil than an *equal weight* of the fresh plant. Trials are yet wanting in which fresh and dry plants have been brought to a fair comparison, by dividing a quantity of the subject into two equal weights, and distilling one while fresh, and the other after it has been carefully and moderately dried.

But whatever may be the effect of moderate exsiccation, it is certain, that if the drying be long continued, the produce of oil will be diminished, its colour altered, and its smell impaired.

With regard to the proportion of water to be employed, if whole plants moderately dried are used, or the shavings of woods, as much of either may be put into the vessel as, lightly pressed, will occupy half its cavity; and as much water may be added as will fill two-thirds of it. The water and ingredients altogether should never take up more than three-fourths of the still: there should be liquor enough to prevent any danger of an empyreuma, but not so much as to be too apt to boil over into the receiver.

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The maceration should be continued so long that the water may fully penetrate the parts of the subject. To promote this effect, woods should be thinly shaved across the grain or sawn, roots cut transversely into thin slices, barks reduced into coarse powder, and seeds slightly bruised. Very compact and tenacious substances require the maceration to be continued a week or two, or longer; for those of a softer and looser texture, two or three days are sufficient; while some tender herbs and flowers not only stand in no need of maceration, but are even injured by it.

Whether the addition of sea-salt, which some have recommended, be of any real service, is much to be doubted. The uses generally assigned to it are, to penetrate and unlock the texture of the subject more effectually than simple water could do, and to prevent the fermentation or putrefaction which the matter is apt to run into during the length of time for which the maceration is often continued. But sea-salt seems rather to harden and condense, than to soften and resolve, both vegetable and animal subjects; and if it prevents putrefaction, it must, on that very account, be injurious rather than of service. The resolution here aimed at approaches near to a beginning putrefaction; and saline substances, by retarding this, prolong the maceration far beyond the time that would otherwise be necessary. It is in the power of the operator, when he perceives the process coming near this pitch, to put a stop to it at pleasure, by proceeding immediately to distillation. By this means the whole affair will be finished in a very little time, with at least equal advantage in every other respect; provided the manual operations of pounding, rasping, and the like, which are equally necessary in either case, be minutely complied with.

Bodies of a very viscid and compact texture were directed, in the Edinburgh pharmacopœia, to be fermented for some days with a little yeast. Half their quantity of water is sufficient for performing the fermentation; as much more as is necessary is to be added afterwards before the distillation. This process undoubtedly promotes the resolution of the subject, and the extrication of the oil. It rarely happens, however, that assistances of this kind are needful. Particular care must be had not to continue the fermentation too long; or to give a bad flavour to the oil by an ill-chosen ferment, or using too large a quantity of any.

Some chemists pretend, that by the addition of salts and acid spirits they have been enabled to gain more oil from certain vegetable matters than could possibly be got from them without such assistance. Experiments made on purpose to settle this point seem to prove the contrary: this at least is constantly found to be true, that where there is any reason to think the produce greater than usual, the quality of the oil is proportionally injured. The quantity of true essential oil in vegetables can by no means be increased; and what is really contained in them may be easily separated without any addition of this kind. All that saline matters can do in this respect is to make the water susceptible of a greater degree of heat than it can sustain by itself, and thus enable it to carry up a gross unctuous matter not volatile enough to rise with pure water: this gross matter, mingling with the pure oil, increases the quantity, but at the same time

must necessarily debase its quality. And indeed, when water alone is used, the oil which comes over about the end of the operation is remarkably less fragrant, and of a thicker consistence, than that which rises at the beginning: distilled a second time, with a gentle heat, it leaves a large quantity of gross almost insipid resinous matter behind.

The choice of proper instruments is of great consequence for the performance of this process to advantage. There are some oils which pass freely over the swan-neck of the head of the common still; others, less volatile, cannot easily be made to rise so high. For obtaining these last, we would recommend a large low head, having a rim or hollow canal round it. In this canal the oil is detained on its first ascent, and thence conveyed at once into the receiver, the advantages of which are sufficiently obvious.

With regard to the fire, the operator ought to be expeditious in raising it at first, and to keep it up, during the whole process, of such a degree that the oil may freely distil; otherwise the oil will be exposed to an unnecessary heat; a circumstance which ought as much as possible to be avoided. Fire communicates to all these oils a disagreeable impregnation, as is evident from their being much less grateful when newly distilled, than after they have stood for some time in a cool place; the longer the heat is continued, the more alteration it must produce in them.

The greater number of oils require for their distillation the heat of water strongly boiling: but there are many also which rise with a heat considerably less; such as those of lemon and citron-peel, of the flowers of lavender and rosemary, and of almost all the more odoriferous kinds of flowers. We have already observed, that these flowers have their fragrance much injured, or even destroyed, by beating or bruising them; it is impaired also by the immersion in water in the present process, and the more so in proportion to the continuance of the immersion and the heat: hence oils, distilled in the common manner, prove much less agreeable in smell than the subjects themselves. For the distillation of substances of this class another method has been contrived; instead of being immersed in water, they are exposed only to its vapour. A proper quantity of water being put into the bottom of the still, the odoriferous herbs or flowers are laid lightly in a basket, of such a size that it may enter into the still, and rest against its sides, just above the water. The head being then fitted on, and the water made to boil, the steam, percolating through the subject, imbibes the oil, without impairing its fragrance, and carries it over to the receiver. Oils thus obtained possess the odour of the subject in an exquisite degree, and have nothing of the disagreeable scent perceivable in those distilled by boiling them in water in the common manner.

It may be proper to observe, that those oils which rise with a less heat than that of boiling water, are generally called, by the chemical and pharmaceutical writers, *light* oils; and those which require the heat of water strongly boiling, are called *ponderous*. We have avoided these expressions, as they might be thought to relate to the comparative *gravities* of the oils; with which the volatility or fixedness have no connection. Olive oil is lighter than most of the es-

essential oils; but the heat requisite to make it distill, exceeds that in which the heaviest essential oil distills, considerably more than the heat of boiling water exceeds that of ice.

The water employed in the distillation of essential oils always imbibes some portion of the oil; as is evident from the smell, taste, and colour, which it acquires. It cannot, however, retain above a certain quantity; and therefore, such as has been already used and consequently saturated with oil, may be advantageously employed, instead of common water, in a second, third, or any future distillation of the same subject.

Some late chemical writers recommend, not the water which comes over, but that which remains in the still, to be used a second time. This can be of no service; as containing only such parts of the vegetable as are incapable of arising in distillation, and which serve only to impede the action of the water as a menstruum, and to endanger an empyreuma.

After the distillation of one oil, particular care should be taken to cleanse the worm before it be employed in the distillation of a different plant. Some oils, those of wormwood and aniseeds for instance, adhere to it so tenaciously, as not to be melted out by heat, or washed off by water: the best way of cleansing the worm from these, is to run a little spirit of wine through it.

Essential oils, after they are distilled, should be suffered to stand for some days, in vessels loosely covered with paper, till they have lost their disagreeable fiery odour, and become limpid: then put them up in small bottles, which are to be kept quite full, closely stopped, in a cool place: with these cautions, they will retain their virtues in perfection for many years.

When carelessly kept, they in time gradually lose their flavour, and become gross and thick. Some endeavour to recover them after they have undergone this change, by grinding them with about thrice their weight of common salt, then adding a large proportion of water, and distilling them afresh: the purer part rises thin and limpid, possessing a great degree of the pristine smell and taste of the oil, though inferior in both respects to the original oil. This rectification, as it is called, succeeds equally without the salt: the oils, when thus altered, are nearly in the same state with the turpentine, and other thickened oily juices, which readily yield their purer oil in distillation with water alone.

When essential oils have entirely lost their smell, some recommend adding them in the distillation of a fresh quantity of the oil of the same plant; by which means they are said to satiate themselves anew with the odorous matter, and become entirely renovated. This practice, however, ought doubtless to be disapproved, as being no other than a specious sophistication; for it can do no more than divide, between the old and the new, the active matter which belongs to the new alone.

Essential oils, medicinally considered, agree in the general qualities of pungency and heat; in particular virtues, they differ as much as the subject from which they are obtained, the oil being the direct principle

in which the virtues, or at least a considerable part of the virtues, of the several subjects reside. Thus the carminative virtue of the warm seeds, the diuretic of juniper-berries, the emmenagogue of fennel, the nervine of rosemary, the stomachic of mint, the antiscorbutic of survy-grass, the cordial of ananias, &c. are supposed to be concentrated in their oil.

There is another remarkable difference in essential oils, the foundation of which is less obvious, viz. the degree of their pungency and heat. These are by no means in proportion, as might be expected, to those of the subject they were drawn from. The oil of cinnamon, for instance, is very pungent and fiery; in its undiluted state it is almost caustic; whereas cloves, a spice which in substance is far more pungent than the other, yields an oil which is far less so. This difference seems to depend partly on the quantity of oil afforded, cinnamon yielding much less than cloves, and consequently having its active matter concentrated into a smaller volume; partly on a difference in the nature of the active parts themselves; for though essential oils contain always the specific odour and flavour of their subjects, whether grateful or ungrateful, they do not always contain the whole pungency; this resides frequently in a more fixed resinous matter, and does not rise with the oil. After the distillation of cloves, pepper, and some other spices, a part of their pungency is found to remain behind: a simple tincture of them in rectified spirit of wine is even more pungent than their pure essential oils.

The more grateful oils are frequently used for reconciling to the stomach medicines of themselves disgusting. It has been customary to employ them as correctors for the resinous purgatives; an use which they do not seem to be well adapted to. All the service they can here be of, is, to make the resin sit more easily at first on the stomach: far from abating the irritating quality on which the virulence of its operation depends, these pungent oils superadd a fresh stimulus.

Essential oils are never given alone, on account of their extreme heat and pungency; which in some is so great, that a single drop let fall upon the tongue produces a gangrenous eschar. They are readily imbibed by pure dry sugar, and in this form may be conveniently exhibited. Ground with eight or ten times their weight of sugar, they become soluble in aqueous liquors, and thus may be diluted to any assigned degree. Mucilages also render them miscible with water into an uniform milky liquor. They dissolve likewise in spirit of wine; the more fragrant in an equal weight, and almost all of them in less than four times their own quantity; these solutions may be either taken on sugar, or mixed with syrups, or the like: on mixing them with water, the liquor grows milky, and the oil separates.

The more pungent oils are employed externally against paralytic complaints, numbness, pains, and aches, cold tumors, and in other cases where particular parts require to be heated or stimulated. The tooth-ach is sometimes relieved by a drop of these almost caustic oils, received on cotton, and cautiously introduced into the hollow tooth.

Essential oil of anise, L.

caraway,
lavender,
peppermint,
spearmint,
origanum,
pennyroyal,
rosemary,
juniper-berry,
sassafras root.

159 Let these oils be drawn off by distillation, from an alembic with a large refrigeratory; but, to prevent an empyreuma, water must be added to the ingredient; in which they must be macerated before distillation.

The water which comes over with the oil in distillation is to be kept for use.

Essential oils. E.

Of the herbs of garden mint,
Of peppermint,
Of fennel,
Of the tops of rosemary,
Of the flowering spikes of lavender,
Of aniseeds,
Of juniper-berries,
Of sassafras root,
Of Jamaica pepper.

160 These are prepared almost in the same manner as the simple distilled waters, excepting that for procuring the oil a somewhat less quantity of water is to be used. Seeds and woody matters are first to be bruised or rasped. The oil rises with the water; and as it is lighter or heavier, swims on the surface, or sinks to the bottom, from which it is afterwards to be separated.

It is, however, to be remarked, that, in preparing these distilled waters and oils, so many varieties must necessarily take place from the goodness of the subject itself, its texture, the time of the year, and such like circumstances, that a certain and general rule, which should strictly apply to each example, can scarcely be laid down; wherefore we have only explained the general method, leaving many things to be varied by the judgment of the operator.

To the directions for preparing these essential oils given by the London and Edinburgh colleges, we shall here next subjoin a few remarks on their medical properties.

Essential oil of aniseeds. L. E.

161 This oil possesses the taste and smell of the aniseeds in perfection. It is one of the mildest of the distilled oils; 15 or 20 drops may be taken at a time without danger, though common practice rarely goes so far as half this number. Its smell is extremely durable and diffusive; milk drawn from the breast after taking it, is found impregnated with its odour; and possibly this may be, in part, the foundation of the pectoral virtues usually ascribed to it; in flatulencies and colics, it is said by some to be less effectual than the seeds themselves.

It is remarkable of this oil, that it congeals, even when the air is not sensibly cold, into a butyraceous consistence: and hence, in the distillation of it, the

operator ought not to be over-solicitous in keeping the water in the refrigeratory too cool: it behoves him rather to let it grow somewhat hot, particularly towards the end of the process; otherwise the oil congealing may so stop up the worm, as to endanger blowing off the head of the still, or at least a considerable quantity of oil will remain in it.

Essential oil of caraway seeds. L.

The flavour of this exactly resembles that of the caraway itself. It is a very hot and pungent oil; a single drop is a moderate dose, and five or six is a very large one. It is not unfrequently used as a carminative; and supposed by some to be peculiarly serviceable for promoting urine, to which it communicates some degree of its smell.

Essential oil of lavender flowers. L. E.

This oil, when in perfection, is very limpid, of a pleasant yellowish colour, extremely fragrant, possessing in an eminent degree the peculiar smell generally admired in the flowers. It is a medicine of great use, both externally and internally, in paralytic and lethargic complaints, rheumatic pains, and debilities of the nervous system. The dose is from one drop to five or six.

Lavender flowers yield the most fragrant oil, and considerably the largest quantity of it, when they are ready to fall off spontaneously, and the leaves begin to show themselves: the seeds give out extremely little. The flowers may be separated from the rest of the plant, by drying it a little, and then gently beating it: they should be immediately committed to distillation, and the process conducted with a well regulated gentle heat; too great heat would not only change the colour of the oil, but likewise make a disagreeable alteration in its smell.

Essential oil of the leaves of peppermint. L. E.

This possesses the smell, taste, and virtues of the peppermint in perfection; the colour is a pale greenish yellow. It is a medicine of great pungency and subtilty; and diffuses, almost as soon as taken, a glowing warmth through the whole system. In colics, accompanied with great coldness, and in some hyetoric complaints, it is of excellent service. A drop or two are in general a sufficient dose.

Essential oil of the leaves of common mint. L. E.

This oil smells and tastes strongly of the mint, but is in both respects somewhat less agreeable than the herb itself. It is an useful stomachic medicine; and not unfrequently exhibited in want of appetite, weakness of stomach, retching to vomit, and other like disorders, when not accompanied with heat or inflammation: two or three drops, or more, are given for a dose. It is likewise employed externally for the same purposes; and is an useful ingredient in the stomachic plaster of the shops.

Essential oil of the leaves of origanum. L.

This oil has a very pungent acrimonious taste, and a penetrating smell. It has been chiefly employed externally as an errhine and for easing pains of the teeth.

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tions.*Essential oil of the leaves of jennyroyal. L.*

This oil, in smell and taste, resembles the original plant; the virtues of which it likewise possesses. It is given in hysteric cases, from one to four or five drops.

Essential oil of rosemary. L. E.

The oil of rosemary is drawn from the plant in flower. When in perfection, it is very light and thin, pale, and almost colourless; of great fragrantcy, though not quite so agreeable as the rosemary itself. It is recommended, in the dose of a few drops, in nervous and hysteric complaints. Boerhaave holds it in great esteem against epilepsies and suppressions of the uterine purgations occasioned by weakness and inactivity.

Essential oil of juniper-berries. L. E.

This oil is a very warm and pungent one; of a strong flavour, not unlike that of the berries. In the dose of a drop or two, it proves a serviceable cruminate and stomachic; in one of six, eight, or more, a stimulating, detergent, diuretic, and emmenagogue; it seems to have somewhat of the nature of the turpentine, or their distilled oil; like which it communicates a violent smell to the urine.

The oil of these berries resides partly in vesicles spread through the substance of the fruit, and partly in little cells contained in the seeds: when the berry is dry, and the oil hardened into a resinous substance, it becomes visible, on breaking the seeds, in form of little transparent drops. In order therefore to obtain this oil to advantage, we ought, previous to the distillation, to bruise the berry thoroughly, so as to break the seeds, and entirely lay open the oily receptacles.

Essential oil of saffras. L. E.

This is the most ponderous of all the known essential oils, but rises in distillation with sufficient ease: it appears limpid as water, has a moderately pungent taste, a very fragrant smell, exactly resembling that of the saffras. It stands greatly commended as a sudorific, and for purifying the blood and juices: it is likewise supposed to be of service in humoral asthmas and coughs. The dose is from one drop to eight or ten; though Geoffroy goes as far as twenty.

The decoction remaining after the distillation of the oil, affords by inspissation an useful extract, of a mild, bitterish, subastrigent taste. Hoffman says, he has given it with great benefit, in doses of a scruple, as a corroborant in cachectic cases, in the decline of intermitting fevers, and for abating hypochondriacal spasms.

Essential oil of savin leaves. L. E.

Savin is one of the plants which, in former editions of the Edinburgh pharmacopœia, were directed to be lightly fermented before the distillation: this, however, is not very necessary; for savin yields, without fermentation, and even without any such maceration, a very large quantity of oil. The oil of savin is a celebrated uterine and emmenagogue: in cold phlegmatic habits, it is undoubtedly a medicine of great service, though not capable of performing what it has been often represented to do. The dose is, two or three drops, or more.

Essential oil of Jamaica pepper. E.

This is a very elegant oil, and may be used as a succedaneum to those of some of the dearer spices. It is of a fine pale colour; in flavour more agreeable than the oil of cloves, and not far short of that of nutmegs. It sinks in water, like the oils of some of the eastern spices.

Oil of fossil tar. L.

Distil fossil tar, the *bitumen petroleum*, in a sand heat.

The oil obtained from this tar will be more or less thin according to the continuance of the distillation; and by its continuance the tar will at last be reduced to a black coal; and then the oil will be pretty deep in colour, though perfectly fluid. This oil has a property similar to that of the tincture of nephritic wood in water, appearing blue when looked upon, but of an orange colour when held between the eye and the light. By long keeping it loses this property. It is less disagreeable than some of the other empyreumatic oils which had formerly a place in our pharmacopœia, such as the *oleum latericium*, though very acrid and stimulating.

Oil of turpentine. L.

Take of common turpentine five pounds; water four pints. Distil the turpentine with the water from an alembic of copper. After the distillation of the oil, what remains is yellow resin.

Rectified oil of turpentine. L.

Take of oil of turpentine one pound; water four pints. Distil.

The process here proposed for rectifying this oil, is not only tedious but accompanied with danger. For unless the luting be very close, some of the vapour will be apt to get through; and if this catch fire, it will infallibly burst the vessels. This rectified oil, which in many pharmacopœias is styled *æthereal*, does not considerably differ in specific gravity, smell, taste, or medical qualities, from the former.

The spirit of turpentine, as this essential oil has been styled, is not unfrequently taken internally as a diuretic and sudorific. And in these ways it has sometimes a considerable effect when taken even to the extent of a few drops only. It has, however, been given in much larger doses, especially when mixed with honey. Recourse has principally been had to such doses in cases of chronic rheumatism, particularly in those modifications of it which are styled *sciatica* and *lumbago*. But they have not been often successful, and sometimes they have had the effect of inducing bloody urine.

Animal oil. L.

Take of oil of hartshorn one pound. Distil three times.

Rectified oil of horns, or animal oil. E.

Take of empyreumatic oil, newly distilled from the horns of animals, as much as you will. Distil with a gentle heat, in a matrass furnished with a head, as long as a thin colourless oil comes over, which is to be freed of alkaline salt and spirit by means of water.

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water. That this oil may remain limpid and good, it ought to be put up in small phials, completely filled and inverted, having previously put into each phial a few drops of water, that on inverting it the water may interpose itself between the oil and the mouth of the phial.

The quantity of oil employed in this process should be considerable: for it leaves so much black matter behind in the several distillations, that it is reduced at last to a small portion of its original quantity. It is said, that the product is rendered more limpid, by mixing the oil with quicklime into a soft paste: the lime keeping down more of the gross matter than would remain without such an addition. The quicklime may here also perhaps act by abstracting fixed air; to the absorption of which we are disposed to refer in some measure the spoiling of the oil on exposure to the atmosphere.

The oil was first introduced by Dippelius, whose name it has since generally borne.

Animal oils thus rectified, are thin and limpid, of a subtle, penetrating, not disagreeable smell and taste. They are strongly recommended as anodynes and antispasmodics, in doses from 15 to 30 drops. Hoffman reports, that they procure a calm and sweet sleep, which continues often for 20 hours, without being followed by any languor or debility, but rather leaving the patient more alert and cheerful than before; that they procure likewise a gentle sweat, without increasing the heat of the blood: that given to 20 drops or more, on an empty stomach, six hours before the accession of an intermittent fever, they frequently remove the disorder; and that they are likewise a very generous remedy in inveterate and chronic epilepsies and in convulsive motions, especially if given before the usual time of the attack, and preceded by proper evacuations.

The empyreumatic oils of vegetables, rectified in the same manner by repeated distillations, suffer a like change with the animal; losing their dark colour and offensive smell, and becoming limpid, penetrating, and agreeable: in this state they are supposed, like the animal oil, to be anodyne, antispasmodic, and diaphoretic or sudorific. It is observable, that all the empyreumatic oils dissolve in spirit of wine, and that the oftener they are rectified or redistilled, they dissolve the more readily; a circumstance in which they differ remarkably from essential oils, which, by repeated distillations, become more and more difficult of solution.

How far these preparations really possess the virtues that have been ascribed to them, has not yet been sufficiently determined by experience; the tediousness and trouble of the rectification having prevented their coming into general use, or being often made. They are liable also to a more material inconvenience, in regard to their medicinal use, precariousness in their quality: for how perfectly soever they be rectified, they gradually lose in keeping the qualities they had received from that process, and return more and more towards their original fetid state.

Oil and salt of amber. E.

Take equal parts of amber reduced to a powder and of pure sand. Mix them, and put them into a

glass retort, of which the mixture may fill one half: then adapt a large receiver, and distil in a sand-bath, with a fire gradually increased. At first a spirit will come over, with some yellow oil; then more yellow oil, along with a little salt; and on raising the heat, more of the salt, with a reddish and black coloured oil. When the distillation is finished, empty the liquor out of the receiver; and having collected together the salt which adheres to the sides, dry it by gentle pressure between the folds of blotting paper; then purify it by solution in warm water and by crystallization.

Rectified oil of amber.

Distil the oil in a glass retort with six times its quantity of water till two-thirds of the water have passed into the receiver; then separate the rectified oil from the water, and keep it for use in close shut vessels. *E.*

Take of oil of amber one pound. Distil three times. *L.*

The London college introduce their directions for the preparation of the salt and oil, but in the latter part of their work, under the head of *Amber*. Here we may only observe, that they direct it to be prepared from the amber alone, without the intervention of sand. But this makes no essential difference in the article when prepared.

The Edinburgh college have rejected what was formerly called the spirit, as being nothing else than the watery parts, fraught with the inert properties of the bitumen and a very small portion of the salt. In the distillation of amber, the fire must for some time be continued gentle, scarce exceeding the degree at which water boils, till the aqueous phlegm and thin oil have arisen; after which it is to be slowly increased. If the fire were urged hastily, the amber would swell up, and rise in its whole substance into the receiver, without undergoing the required decomposition or separation of its parts. When sand or similar intermedia are mixed with it, it is less subject to this rarefaction, and the fire may be raised somewhat more expeditiously: though this little advantage is perhaps more than counterbalanced by the room which the sand takes up in the retort.

Our chemists generally leave the receiver unluted, that it may be occasionally removed as the salt rises and concretes in the neck of the retort; from whence it is every now and then scraped out to prevent the oil from carrying it down into the receiver. When a gross thick oil begins to arise, and no more salt appears, the distillation is stopt, though it might perhaps be continued longer to advantage.

Mr Pott informs us (in a curious dissertation on the salt of amber, published in the ninth volume of the Memoirs of the Academy of Sciences of Berlin) that the Prussian workmen, who prepare large quantities of this salt for exportation, from cuttings and small pieces of amber, perform the distillation without any intermedium, and in an open fire: that sweeping out the salt from the neck of the retort being found too troublesome, they suffer the oil to carry it down into the receiver, and afterwards separate it by means of bibulous paper, which smother the oil, but leaves the salt dry; which paper is afterwards squeezed and distilled: that they continue the distillation till all that can be forced.

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forced over has arisen, taking care only to catch the last thick oil in a separate receiver, and that from this they extract a considerable quantity of salt, by shaking it in a strong vessel with three or four fresh portions of hot water, and evaporating and crystallizing the filtered waters.

The spirit of amber, so called, is no more than a solution of a small proportion of the salt in phlegm or water; and therefore is very properly employed for dissolving the salt in order to its crystallization.

The salt, freed from as much of the oil as spongy paper will imbibe, retains so much as to appear of a dark brown colour. Mr Pott says, the method he has found to succeed best, and with least loss, is, to dissolve the salt in hot water, and put into the paper, through which the solution is to be filtered, a little cotton slightly moistened with oil of amber: this, he says, detains a good deal of the oil of the salt, and the solution passes through the more pure. The liquor being evaporated with a very gentle fire, as that of a water-bath, and set to shoot, the first crystals prove transparent, with a slight yellowish tinge; but those which follow are brown, oily, and bitter, and are therefore to be further depurated in the same manner. The whole quantity of crystals amounts to about one-thirtieth of the weight of the crude amber employed. By sublimation from sea salt, as directed in former editions of the Edinburgh pharmacopœia, the salt is thought to be more perfectly and more expeditiously purified: Mr Pott objects to sublimation, that a part of the salt is decomposed by it, a coaly matter being left behind, even though the salt was previously purified by crystallization: it may be presumed, however, that this coal proceeds rather from the burning of some remains of the oily matter, than from the decomposition of any part of the true salt.

Pure salt of amber has a penetrating, subastringent, acid, taste. It dissolves both in water and in rectified spirit; though not readily in either, and scarcely at all in the latter without the assistance of heat: of cold water in summer, it requires for its solution about twenty times its own weight; of boiling water only about twice its weight. Exposed in a glass vessel, to a heat little greater than that of boiling water, it first melts, then rises in a white fume, and concretes again in the upper part of the glass into fine white flakes, leaving, unless it was perfectly pure, a little coaly matter behind. It effervesces with alkalis both fixed and volatile, and forms with them neutral compounds much resembling those composed of the same alkalis and vegetable acids. Mixed with acid liquors, it makes no sensible commotion. Ground with fixed alkaline salts, it does not exhale any urinous odour. By these characters, it is conceived this salt may be readily distinguished from all the other matters that have been mixed with or vended for it. With regard to its virtue, it is accounted aperient, diuretic, and, on account of its retaining some portion of the oil, antihysterical: Boerhaave gives it the character of *diureticorum et antihystericorum princeps*. Its great price, however, has prevented its coming much into use; and perhaps its real virtues are not equal to the opinion generally entertained of them.

The rectified oil has a strong bituminous smell, and a pungent acrid taste. Given in a dose of ten or

twelve drops, it heats, stimulates, and promotes the fluid secretions: it is chiefly celebrated in hysterical disorders, and in deficiencies of the uterine purgations. Sometimes it is used externally, in liniments for weak or paralytic limbs and rheumatic pains. This oil differs from all those of the vegetable kingdom, and agrees with the mineral petrolea, in not being soluble either in its rectified or unrectified state, by spirit of wine, fixed alkaline lixivium, or volatile alkaline spirits; the oil, after long digestion or agitation, separating as freely as common oil does from water.

Oil of wine. L.

Take alcohol, vitriolic acid, of each one pint. Mix them by degrees, and distil, taking care that no black foam passes into the receiver. Separate the oily part of the distilled liquor from the volatile vitriolic acid. To the oily part add as much water of pure kali as is sufficient to take away the sulphureous smell: then distil the ether with a gentle heat. The oil of wine remains in the retort, swimming on the watery liquor, from which it is to be separated.

Some caution is requisite in mixing the two liquors, that the consequent heat and ebullition, which would not only dissipate a part of the mixture, but hazard the breaking of the vessel and the hurt of the operator, may be avoided. The securest way is to add the vitriolic acid to the spirit of wine by a little at a time, waiting till the first addition be incorporated before another quantity be put in. By this, the ensuing heat is inconsiderable, and the mixture is effected without inconvenience.

Essential oil of wormwood. Ross.

Let the fresh leaves of wormwood slightly dried be macerated with a sufficient quantity of water, and then subject to distillation; and let the oil which comes over be separated from the water which accompanies it.

This is one of the more ungrateful oils: it smells strongly of the wormwood, and contains its particular nauseous taste, but has little or nothing of its bitterness, this remaining entire in the decoction left after the distillation: its colour, when drawn from the fresh herb, is a dark green; from the dry, a brownish yellow. This oil is recommended by Hoffman as a mild anodyne in spasmodic contractions; for this purpose, he directs a dram of it to be dissolved in an ounce of rectified spirit of wine, and seven or eight drops of the mixture taken for a dose in any convenient vehicle. Boerhaave greatly commends, in tertian fevers, a medicated liquor composed of about seven grains of this oil ground first with a dram of sugar, then with two drams of the salt of wormwood, and afterwards dissolved in six ounces of the distilled water of the same plant: two hours before the fit is expected, the patient is to bathe his feet and legs in warm water, and then to drink two ounces of the liquor every quarter of an hour till the two hours are expired: by this means, he says, all cases of this kind are generally cured with ease and safety, provided there be no schirrosity or suppuration. The oil of wormwood is employed chiefly as a vermifuge; and for this purpose is sometimes applied both externally to the belly, and

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taken internally; it is most conveniently exhibited in the form of pills, into which it may be reduced by mixing it with crumb of bread.

In the same manner with the oil of wormwood, the following oils, mentioned on the authority of the pharmacopœia Rosica, are also directed to be prepared.

Essential oil of orange skins. Ross.

Effence of lemons.

182 Of these essential oils, as existing in a separate state in the growing vegetable, we have already offered some observations. They are obtained in a very pure state by distillation. They are now rejected from our pharmacopœias, being employed rather as perfumes than as medicines. This is particularly the case with the essence of lemons, which is a pleasant oil, of a fine smell, very nearly as agreeable as that of the fresh peel; it is one of the lightest and most volatile essential oils we have, perfectly limpid, and almost colourless. It is taken in doses of two or three drops, as a cordial, in weakness of the stomach, &c. though more frequently used as a perfume. It gives a fine flavour to the officinal volatile aromatic spirit of the Edinburgh college, or the compound spirit of ammonia, as it is now styled by that of the London: and it may be remarked, that it enters the formula of both colleges, altho' neither of them has given it a place among their preparations, probably as it is one of those articles which the apothecary rarely prepares for himself. When soap is given in the form of pills, by the addition of a few drops of this oil they are thought to sit more easily on the stomach.

Essential oil of cloves. Ross.

183 This oil is so ponderous as to sink in water, and is not easily elevated in distillation: if the water which comes over be returned on the remaining cloves, and the distillation repeated, some more oil will generally be obtained, though much inferior in quality to the first. The oil of cloves is usually described as being "in taste excessively hot and fiery, and of a gold yellow colour," (*Boerb. procl.*). Such indeed is the composition which we receive under this name from Holland; but the genuine oil of cloves is one of the milder oils: it may be taken with great safety (duly diluted) to the quantity of 10 or 12 drops or more. Nor is its colour at all yellow, unless it has been long and carelessly kept, or distilled by too violent a fire: when in perfection, it is limpid and colourless, of a pleasant, moderately warm, and pungent taste, and a very agreeable smell, much resembling that of the spice itself. The Dutch oil of cloves contains a large quantity of expressed oil, as evidently appears upon examining it by distillation. This, however, cannot be the addition to which it owes its acrimony. A mean proportion of a resinous extract of cloves communicates to a large one of oil a deep colour, and a great degree of acrimony.

Essential oil of camomile. Ross.

184 An oil of camomile had formerly a place in our pharmacopœias made by infusion of the recent plant, and its flowers in olive oil; and again separating it by

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pressure after impregnating it with the active parts of the plant by heat. This, however, was intended only for external application; but the essential oil is meant to be used internally.

It is a very pungent oil, of a strong not ungrateful smell, resembling that of the flowers: its colour is yellow, with a cast of greenish or brown. It is sometimes given in the dose of a few drops, as a carminative, in hyberic disorders, and likewise as a vermifuge: it may be conveniently made into pills with crumb of bread.

Oil of cinnamon. Ross.

This valuable oil is extremely hot and pungent, of a most agreeable flavour, like that of the cinnamon itself. In cold languid cases, and debilities of the nervous system, it is one of the most immediate cordials and restoratives. The dose is one, two, or three drops: which must always be carefully diluted by the mediation of sugar, &c.; for so great is the pungency of this oil, that a single drop let fall upon the tongue, undiluted, produces, as Boerhaave observes, a gangrenous eschar. In the distillation of this oil, a smart fire is required; and the low head, with a channel round it, recommended for the distillation of the less volatile oils, is particularly necessary for this, which is one of the least volatile, and which is afforded by the spice in exceeding small quantity. The distilled water retains no small portion of the oil; but this oil being very ponderous, great part of it subsides from the water, on standing for two or three weeks in a cool place.

Essential oil of fennel-seeds. Ross.

The oil obtained from sweet fennel-seeds is much more elegant and agreeable than that of the common fennel. It is one of the mildest of these preparations: it is nearly of the same degree of warmth with that of aniseeds; to which it is likewise similar in flavour, though far more grateful. It is given from two or three drops to ten or twelve, as a carminative, in cold indispositions of the stomach; and in some kinds of coughs for promoting expectoration.

Essential oil of rhodium. Ross.

This oil is extremely odoriferous, and principally employed as a perfume in scenting pomatums, and the like. Custom has not as yet received any preparation of this elegant aromatic wood into internal use among us.

Essential oil of mace. Ross.

The essential oil of mace is moderately pungent, very volatile, and of a strong aromatic smell, like that of the spice itself. It is thin and limpid, of a pale yellowish colour, with a portion of thicker and darker coloured oil at the bottom. This oil, taken internally to the extent of a few drops, is celebrated in vomiting, singultus, and colic pains; and in the same complaints it has also been advised to be applied externally to the umbilical region. It is, however, but rarely to be met with in the shops.

Essential oil of marjoram. Ross.

This oil is very hot and penetrating, in flavour not near so agreeable as the marjoram itself; when in perfection, it is of a pale yellow colour; by long keeping,

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it turns reddish : if distilled with too great a heat, it rises of this colour at first. It is supposed by some to be peculiarly serviceable in relaxations, obstructions, and mucous discharges of the uterus : the dose is one or two drops.

Essential oil of nutmegs. Roff.

- 190 The essential oil of nutmegs possesses the flavour and aromatic virtues of the spice in an eminent degree. It is similar in quality to the oil of mace, but somewhat less grateful.

Essential oil of rue. Roff.

- 191 The oil of rue has a very acrid taste, and a penetrating smell, resembling that of the herb, but rather more unpleasant. It is sometimes made use of in hysterical disorders and as an anthelmintic ; and also in epilepsies proceeding from a relaxed state of the nerves.

Rue yields its oil very sparingly. The largest quantity is obtained from it when the flowers are ready to fall off, and the seeds begin to show themselves : suitable maceration, previous to the distillation, is here extremely necessary.

Essential oil of savory. Roff.

- 192 Savory yields on distillation a small quantity of essential oil, of great subtilty and volatility ; and it is unquestionably an active article, but among us it is not employed in medicine.

Essential oil of tanfy. Roff.

- 193 Tanfy yields on distillation an oil of a greenish colour inclining to yellow. It smells strongly of the herb, and possesses at least its aromatic property in a concentrated state.

Oil of wax. Dan.

- 194 Melt yellow bees-wax with twice its quantity of sand, and distil in a retort placed in a sand-furnace. At first an acid liquor rises, and afterwards a thick oil, which sticks in the neck of the retort, unless it be heated by applying live coal. This may be rectified into a thin oil, by distilling it several times, without addition, in a sand-heat.

Boerhaave directs the wax, cut in pieces, to be put into the retort first, so as to fill one half of it ; when as much sand may be poured thereon as will fill the remaining half. This is a neater, and much less troublesome way, than melting the wax, and mixing it with the sand before they are put into the retort. The author above-mentioned highly commends this oil against roughness and chaps of the skin, and other like purposes : the college of Strasburgh speak also of it being given internally, and say it is a powerful diuretic (*ingens diureticum*) in doses from two to four or more drops ; but its disagreeable smell has prevented its coming into use among us.

The number of essential oils which have now a place in the London and Edinburgh pharmacopœias, and likewise in the foreign ones of modern date, is much less considerable than formerly ; and perhaps those still retained afford a sufficient variety of the more active and useful oils. Most of the oils mentioned above, particularly those which have a place in the London and Edinburgh pharmacopœias, are prepared by our

chemists in Britain, and are easily procurable in a tolerable degree of perfection : but the oils from the more expensive spices, though still introduced among the preparations in the foreign pharmacopœias, are, when employed among us, usually imported from abroad.

These are frequently so much adulterated, that it is not an easy matter to meet with such as are fit for use. Nor are these adulterations easily discoverable. The grosser abuses, indeed, may be readily detected : thus, if the oil be mixed with spirit of wine, it will turn milky on the addition of water ; if with expressed oils, rectified spirit will dissolve the essential, and leave the other behind ; if with oil of turpentine, on dipping a piece of paper in the mixture, and drying it with a gentle heat, the turpentine will be betrayed by its smell. But the more subtle artists have contrived other methods of sophistication, which elude all trials of this kind.

Some have looked upon the specific gravity of oils as a certain criterion of their genuineness ; and accordingly we have given a table of the gravity of several. This, however, is not to be absolutely depended on : for the genuine oils, obtained from the same subjects, often differ in gravity as much as those drawn from different ones. Cinnamon and cloves, whose oils usually sink in water, yield, if slowly and warily distilled, an oil of great fragrancy, which is nevertheless specifically lighter than the aqueous fluid employed in the distillation of it ; while, on the other hand, the last runnings of some of the lighter oils prove sometimes so ponderous as to sink in water.

As all essential oils agree in the general properties of solubility in spirit of wine, indissolubility in water, miscibility with water by the intervention of certain intermedia, volatility in the heat of boiling water, &c. it is plain that they may be variously mixed with each other, or the dearer sophisticated with the cheaper, without any possibility of discovering the abuse by any trials of this kind. And indeed it would not be of much advantage to the purchaser, if he had infallible criteria of the genuineness of every individual oil. It is of as much importance that they be *good*, as that they be *genuine* ; for genuine oils, from inattentive distillation and long and careless keeping, are often weaker both in smell and taste than the common sophisticated ones.

The smell and taste seem to be the only certain tests of which the nature of the thing will admit. If a bark should have in every respect the appearance of good cinnamon, and should be proved indisputably to be the genuine bark of the cinnamon-tree ; yet if it want the cinnamon flavour, or has it but in a low degree, we reject it ; and the case is the same with the oil. It is only from use and habit, or comparisons with specimens of known quality, that we can judge of the goodness either of the drugs themselves or of their oils.

Most of the essential oils, indeed, are too hot and pungent to be tasted with safety ; and the smell of the subject is so much concentrated in them, that a small variation in this respect is not easily distinguished ; but we can readily dilute them to any assignable degree. A drop of the oil may be dissolved in spirit of wine, or received on a bit of sugar, and dissolved by that intermedium in water. The quantity of liquor which it thus impregnates with its flavour, or the degree of flavour

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flavour which it communicates to a certain determinate quantity, will be the measure of the degree of goodness of the oil.

We shall here subjoin the result of some experiments, showing the quantity of essential oil obtained from different vegetables, reduced into the form of a table. The first column contains the names of the respective vegetable substances; the second, the quantity of each which was submitted to the distillation; and the third, the quantity of oil obtained. In every other part of this article, where pound weights are mentioned, the Troy pound of 12 ounces is meant: but these experiments having been all made by a pound of 16 ounces, it was thought expedient to set down the matter of fact in the original weights: especially as the several materials, in the large quantity commonly required for the

distillation of oils, are purchased by weights of the same kind. But to remove any ambiguity which might arise from hence, and to enable the reader to judge more readily of the product, a reduction of the weights is given in the next column; which shows the number of parts of each of the subjects from which one part of oil was obtained. To each article is affixed the author's name from whom the experiment was taken. The different distillations of one subject, several of which are inserted in the table, show how variable the product of oil is, and that the exotic spices, as well as our indigenous plants, do not always contain the same proportion of this active principle; though it must be observed, also, that part of the differences may probably arise from the operation itself having been more or less carefully performed.

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TABLE of the Quantity of ESSENTIAL OIL obtained from different VEGETABLES.

Agallochum wood	-	10 lb.	4 dra.	320	Hoff.
Angelica root	-	1 lb.	1 dra.	128	Carth.
Aniseed	-	1 lb.	4 dra.	32	Neum.
Aniseed	-	3 lb.	1 oz.	48	Lewis.
Aniseed	-	4 lb.	1 oz.	64	Lewis.
Asafoetida	-	4 oz.	1 dra.	32	Neum.
Calamus aromaticus	-	50 lb.	2 oz.	185	Hoff.
Calamus aromaticus	-	1 lb.	2 scr.	192	Neum.
Caraway seeds	-	4 lb.	2 oz.	32	Lewis.
Caraway seeds	-	2 lb.	9 dra.	28½	Lewis.
Caraway seeds	-	1 cwt.	83 oz.	21½	Lewis.
Caroline thistle roots	-	1 lb.	2½ scr.	153	Neum.
Cardamom seeds	-	1 oz.	1 scr.	24	Neum.
Carrot seeds	-	2 lb.	1½ dra.	171	Lewis.
Cascarilla	-	1 lb.	1 dra.	128	Carth.
Camomile flowers	-	1 lb.	30 gra.	256	Carth.
Common camomile flowers	-	6 lb.	5 dra.	153	Lewis.
Wild camomile flowers	-	1 lb.	20 gra.	384	Carth.
Wild camomile flowers	-	6 lb.	2½ dra.	307	Lewis.
Chervil leaves, fresh	-	9 lb.	30 gra.	2304	Neum.
Cedar wood	-	1 lb.	2 dra.	64	Marg.
Cinnamon	-	1 lb.	1 dra.	128	Sala.
Cinnamon	-	1 lb.	2½ scr.	153	Neum.
Cinnamon	-	4 lb.	6 dra.	85½	Lemery.
Cinnamon	-	1 lb.	2 dra.	64	Carth.
Cinnamon	-	1 lb.	8 scr.	45½	Carth.
Clary seeds	-	4 lb.	2 dra.	256	Lewis.
Clary in flower, fresh	-	130 lb.	3½ oz.	504	Lewis.
Cloves	-	1 lb.	1½ oz.	10½	Teichm.
Cloves	-	1 lb.	2½ oz.	7½	Carth.
Cloves	-	2 lb.	5 oz.	6½	Hoff.
Copaiba balsam	-	1 lb.	6 oz.	2½	Hoff.
Copaiba balsam	-	1 lb.	8 oz.	2	Lewis.
Cummin-seed	-	1 bush	21 oz.		Lewis.
Dictamnus Creticus	-	1 lb.	30 gra.	256	Lewis.
Dill-seed	-	4 lb.	2 oz.	32	Lewis.
Elecampane root	-	2 lb.	3¼ scr.	245	Neum.
Elmi	-	1 lb.	1 oz.	16	Neum.
Fennel-seed, common	-	2 oz.	1 scr.	48	Neum.
Fennel-seed, sweet	-	1 bush	18 oz.		Lewis.
Galangal root	-	1 lb.	1 dra.	128	Carth.
Garlic root, fresh	-	2 lb.	30 gra.	256	Neum.
Ginger	-	1 lb.	1 dra.	128	Neum.
Horfe-radish root, fresh	-	8 oz.	15 gra.	256	Neum.
Hyslop leaves	-	2 lb.	1½ dra.	237	Neum.

yielded of essential oil

so that one part of oil was obtained from

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Hyssop leaves	1 lb.	1½ dra.	85	Carth.
Hyssop leaves	1 lb.	2 dra.	64	Carth.
Hyssop leaves, fresh	2 cwt.	6 oz.	597	Lewis.
Hyssop leaves, fresh	10 lb.	3 dra.	427	Lewis.
Hyssop leaves, fresh	30 lb.	9 dra.	427	Lewis.
Juniper-berries	8 lb.	3 oz.	42½	Hoff.
Juniper-berries	1 lb.	3 dra.	42½	Carth.
Lavender in flower, fresh	48 lb.	12 oz.	64	Lewis.
Lavender in flower, fresh	30 lb.	6½ oz.	72	Lewis.
Lavender in flower, fresh	13½ lb.	60 oz.	473	Lewis.
Lavender flowers, fresh	2 lb.	4 dra.	64	Hoff.
Lavender flowers, dried	4 lb.	2 oz.	32	Lewis.
Lavender flowers, dried	2 lb.	1 oz.	32	Hoff.
Lavender flowers, dried	4 lb.	3 oz.	21½	Hoff.
Broad-leaved lavender flowers, dry	4 lb.	1 oz.	64	Hoff.
Broad-leaved lavender flowers, dry	1 lb.	2 dra.	64	Carth.
Lovage root	1 lb.	1 dra.	128	Carth.
Mace	1 lb.	5 dra.	25½	Neum.
Mace	1 lb.	6 dra.	21½	Carth.
Marjoram in flower, fresh	81 lb.	3½ oz.	347	Lewis.
Marjoram in flower, fresh	13½ lb.	3½ dra.	493	Lewis.
Marjoram in flower, fresh	34 lb.	1½ oz.	362	Lewis.
Marjoram leaves, fresh	18½ lb.	4 dra.	592	Lewis.
Marjoram leaves, dried	4 lb.	1 oz.	64	Hoff.
Masterwort root	1 lb.	30 gra.	256	Neum.
Milfoil flowers, dried	14 lb.	4 dra.	448	Neum.
Mint in flower, fresh	6 lb.	4½ dra.	177	Neum.
Mint-leaves, dried	4 lb.	1½ oz.	42½	Hoff.
Peppermint, fresh	4 lb.	3 dra.	170½	Hoff.
Myrrh	1 lb.	2 dra.	64	Hoff.
Myrrh	1 lb.	3 dra.	42½	Neum.
Nutmegs	1 lb.	1 oz.	16	Hoff.
Nutmegs	1 lb.	1 oz.	16	Geoff.
Nutmegs	1 lb.	4 dra.	32	Neum.
Nutmegs	1 lb.	6 dra.	21½	Sala.
Nutmegs	1 lb.	5 dra.	25½	Carth.
Parsley seeds	2 lb.	1 dra.	256	Carth.
Parsley leaves, fresh	238 lb.	2 oz.	1904	Carth.
Parsnip seeds	8 lb.	2 dra.	512	Carth.
Pennyroyal in flower, fresh	13 lb.	6 dra.	277	Carth.
Black pepper	2 lb.	6 dra.	42½	Carth.
Black pepper	1 lb.	2½ dra.	82	Neum.
Black pepper	1 lb.	4 scr.	96	Carth.
Black pepper	1 lb.	1 dra.	128	Heister.
Black pepper	6 lb.	3 dra.	256	Geoff.
Pimento	1 oz.	30 gra.	16	Neum.
Rhodium wood	1 lb.	3 dra.	42½	Neum.
Rhodium wood	1 lb.	2 dra.	64	Sala.
Rhodium wood	1 lb.	3 dra.	42½	Sala.
Rhodium wood	1 lb.	3 dra.	42½	Carth.
Rhodium wood	1 lb.	4 dra.	32	Carth.
Rosemary in flower	1 cwt.	8 oz.	224	Lewis.
Rosemary leaves	1 lb.	2 dra.	64	Sala.
Rosemary leaves	1 lb.	3 dra.	42½	Sala.
Rosemary leaves	3 lb.	3½ dra.	121	Neum.
Rosemary leaves	1 lb.	1 dra.	128	Carth.
Rosemary leaves	1 lb.	1½ dra.	82	Carth.
Rosemary leaves, fresh	70 lb.	5 oz.	224	Lewis.
Roses	100 lb.	4 dra.	3200	Tachen.
Roses	100 lb.	1 oz.	1600	Homb.
Roses	12 lb.	30 gra.	768	Hoff.
Rue	10 lb.	2 dra.	640	Hoff.
Rue	10 lb.	4 dra.	320	Hoff.
Rue in flower	4 lb.	1 dra.	512	Hoff.
Rue in flower	60 lb.	2½ oz.	507	Hoff.

yielded of essential oil

so that one part of oil was obtained from

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Rue

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Rue with the seeds	72 lb.	3 oz.	384	Hoff.
Saffron	1 lb.	1½ dra.	85½	Vogel.
Sage leaves	1 lb.	5 scr.	77	Carth.
Sage in flower, fresh	34 lb.	1½ oz.	544	Lewis.
Sage of virtue in flower	27 lb.	6 dra.	576	Lewis.
Sage of virtue in flower	8 lb.	1½ dra.	681	Lewis.
Sassafras	6 lb.	1½ oz.	55	Hoff.
Sassafras	6 lb.	2 oz.	48	Neum.
Savin	2 lb.	5 oz.	6½	Hoff.
Saunders, yellow	1 lb.	2 dra.	64	Carth.
Smallage seeds	1 lb.	2½ scr.	154	Neum.
Stechas in flower, fresh	5½ lb.	2 dra.	368	Lewis.
Thyme in flower, fresh	2 cwt.	5½ oz.	652	Lewis.
Thyme in flower, dry	3½ lb.	1½ dra.	298	Lewis.
Lemon thyme in flower, fresh	51 lb.	1½ oz.	653	Lewis.
Lemon thyme in flower, fresh	98 lb.	2½ oz.	627	Lewis.
Lemon-thyme, a little dried	104 lb.	3 oz.	555	Lewis.
Wormwood leaves, dry	4 lb.	1 oz.	64	Lewis.
Wormwood leaves, dry	18 lb.	1½ oz.	192	Lewis.
Wormwood leaves, dry	25 lb.	3½ oz.	114	Lewis.
Zedoary	1 lb.	1 dra.	128	Neum.

yielded of essential oil

so that one part of oil was obtained from

CHAP. VII. Salts.

Diluted or weak vitriolic acid. L.

196 Take of vitriolic acid, one ounce by weight; distilled water, 8 ounces by weight. Mix them by degrees.

Weak vitriolic acid, commonly called weak spirit of vitriol. E.

Take of vitriolic acid, one part; water, seven parts. Mix them.

In the former editions of our pharmacopœias, directions were given for the preparation of the vitriolic acid by the apothecary himself, under the heads of *spirit and oil of vitriol, spirit or oil of sulphur by the bell,* &c.: but as it is now found that all these modes are expensive, and that this acid may be furnished at a cheaper rate from the trading chemists preparing it on a large scale, it is with propriety that both colleges have now rejected it from the preparations, and introduced it only into the list of the materia medica.

When, however, it is of the degree of concentration there required, it can be employed for very few purposes in medicine. The most simple form in which it can be advantageously employed internally, is that in which it is merely diluted with water: and it is highly proper that there should be some fixed standard in which the acid in this state should be kept. It is, however, much to be regretted, that the London and Edinburgh colleges have not adopted the same standard with respect to strength: for in the one, the strong acid constitutes an eighth; and in the other, only a ninth of the mixture. The former proportion, which is that of the Edinburgh college, we are inclined to prefer, as it gives exactly a dram of acid to the ounce: but the dilution by means of distilled water, which is directed by the London, is preferable to spring-water; which, even in its purest state, is rarely free from impregnations in part affecting the acid.

The acid of vitriol is the most ponderous of all the liquids we are acquainted with, and the most powerful of the acids. If any other acid be united with a fixed alkaline salt or earth, on the addition of the vitriolic,

such acid will be dislodged, and arise on applying a moderate heat, leaving the vitriolic in possession of the alkali; though without this addition it would not yield to the most vehement fire. Mixed with water, it instantly creates great heat, inasmuch that glass vessels are apt to crack from the mixture, unless it be very slowly performed: exposed to the air, it imbibes moisture, and soon acquires a remarkable increase of weight. In medicine, it is employed chiefly as subservient to other preparations: it is also frequently mixed with juleps and the like, in such quantity as will be sufficient to give the liquor an agreeable tartness, and it then is a cooling antiseptic, a restringent, and a stomachic.

It is particularly useful for allaying inordinate actions of the stomach, when under the form of singultus or vomiting. For its medical properties, see ACIDS and VITRIOL.

Nitrous acid. L.

197 Take of purified nitre, by weight, 60 ounces; vitriolic acid, by weight, 29 ounces. Mix and distil.

The specific gravity of this is to the weight of distilled water as 1550 to 1000.

Nitrous acid, commonly called Glauber's spirit of nitre. E.

Take of purest nitre, bruised, two pounds; vitriolic acid, one pound. Having put the nitre into a glass retort, pour on it the spirit; then distil in a sand-heat, gradually increasing the fire, till the sand-pot becomes of a dull red colour.

Here the vitriolic acid expels the nitrous, in red corrosive vapours, which begin to issue immediately on mixture; and which the operator ought cautiously to avoid. A pound of acid of vitriol is sufficient to expel all the acid from about two pounds of nitre, not from more: some direct equal parts of the two. The spirit, in either case, is in quality the same; the difference, in this respect, affecting only the residuum. If two parts of nitre be taken to one of vitriolic acid, the remaining alkaline basis of the nitre is completely saturated with the vitriolic acid; and the residuum is a neutral salt, the same with vitriolated tartar, as we shall

shall see hereafter. If more nitre be used, a part of the nitre in substance will remain blended with this neutral salt: if less nitre, it cannot afford alkali enough to saturate the vitriolic acid, and the residuum will not be a neutral salt, but a very acid one. In this last case there is one convenience; the acid salt being readily soluble in water, so as to be got out without breaking the retort, which the others are not.

Diluted or weak nitrous acid. L.

- 198 Take of nitrous acid, distilled water, each one pound.
Mix them.

Weak nitrous acid. E.

Take of nitrous acid, water, equal weights. Mix them, taking care to avoid the noxious vapours.

In the old editions both of the London and Edinburgh pharmacopœias, directions were given for the preparation of aquafortis simplex and duplex; but these were no more than different forms of preparing an impure nitrous acid, unfit for medical purposes. They are therefore, with propriety, superseded by the more simple formulæ of nitrous acid and diluted or weak nitrous acid, mentioned above. In making the diluted acid, distilled water is preferable to common water.

The vapour separated during the mixing of nitrous acid and water, is the permanently elastic fluid called *nitrous acid air*, which is deleterious to animal life.

The acid of nitre is next in strength to the vitriolic, and dislodges all others from alkaline salts or earths. It differs from all the other acids in deflagrating with inflammable matters: if a solution of any inflammable substance, as hartshorn, &c. in this acid, be set to evaporate, as soon as the matter approaches to dryness, a violent detonation ensues. The chief use of this acid is as a menstruum for certain minerals, and as the basis of some particular preparations to be mentioned hereafter. It has been given likewise, diluted with any convenient vehicle, as a diuretic, from 10 to 50 drops.

Muriatic acid. L.

- 199 Take of dry sea-salt, 10 pounds; vitriolic acid, six pounds; water, five pounds. Add the vitriolic acid first mixed with the water by degrees, to the salt; then distil.

The specific gravity of this acid is to distilled water as 1170 to 1000.

Muriatic acid, commonly called spirit of sea-salt. E.

Take of sea-salt, two pounds; vitriolic acid, water, each one pound. Let the salt be first put into a pot, and brought to a red heat, that the oily impurities may be consumed; then put it into the retort. Next mix the acid with the water, and when the mixture has cooled, pour it upon the salt. Lastly, distil in a sand heat with a middling heat, as long as any acid comes over.

The marine, or muriatic acid, arises, not in red fumes like the nitrous, but in white ones. The addition of water is more necessary here than in the foregoing processes; the marine vapours being so volatile, as scarcely to condense without some adventitious humidity. The acid of vitriol is most conveniently mix-

ed with the water in an earthen or stone-ware vessel: for unless the mixture be made exceedingly slow, it grows so hot as to endanger breaking a glass one.

The spirit of sea-salt is the weakest of the mineral acids, but stronger than any of the vegetable: it requires a greater fire to distil it than that of nitre, yet it is more readily dissipated by the action of the air. It is used chiefly as a menstruum for the making of other preparations; sometimes, likewise, it is given, properly diluted, as an antiphlogistic, aperient, and diuretic, from 10 to 60 or 70 drops.

Distilled vinegar.

Take of vinegar five pints. Distil with a gentle fire, in glass vessels, so long as the drops fall free from empyreuma. *L.*

Let eight pounds of vinegar be distilled in glass vessels with a gentle heat. Let the two first pounds that come over be thrown away as containing too much water; let four pounds next following be reserved as the distilled vinegar. What remains is a still stronger acid, but too much acted on by the heat. *E.*

This process may be performed either in a common still with its head, or in a retort. The better kinds of wine-vinegar should be used: those prepared from malt liquors, however fine and clear they may seem to be, contain a large quantity of a viscous substance, as appears from the sliminess and ropyness to which they are very much subject: this not only hinders the acid parts from rising freely, but likewise is apt to make the vinegar boil over into the recipient, and at the same time disposes it to receive a disagreeable impression from the fire. And indeed, with the best kind of vinegar, if the distillation be carried on to any great length, it is extremely difficult to avoid an empyreuma. The best method of preventing this inconvenience is, if a retort be used, to place the sand but a little way up its sides, and when somewhat more than half the liquor is come over, to pour on the remainder a quantity of fresh vinegar equal to the liquor drawn off. This may be repeated three or four times; the vinegar supplied at each time being previously heated. The addition of cold liquor would not only prolong the operation, but also endanger the breaking of the retort. If the common still be employed, it should likewise be occasionally supplied with fresh vinegar in proportion as the spirit runs off; and this continued until the process can be conveniently carried no farther: the distilled spirit must be rectified by a second distillation in a retort or glass alembic; for although the head and receiver be of glass or stone ware, the acid will contract a metallic taint from the pewter worm.

The residuum of this process is commonly thrown away as useless, although, if skilfully managed, it might be made to turn to good account; the most acid parts of the vinegar still remaining in it. Mixed with about three times its weight of fine dry sand, and committed to distillation in a retort, with a well-regulated fire, it yields an exceeding strong acid spirit, together with an empyreumatic oil, which taints the spirit with a disagreeable odour. This acid is nevertheless, without any rectification, better for some purposes (as a little

of it will go a great way) than the pure spirit; particularly for making the diuretic or acetated kali of the London college; for there the oily matter, on which its ill flavour depends, is burnt out by the calcination.

The spirit of vinegar is a purer and stronger acid than vinegar itself, with which it agrees in other respects. (See VINEGAR). Their principal difference from the mineral acid consists in their being milder, less stimulating, less disposed to affect the kidneys and promote the urinary secretions, or to coagulate the animal juices. The matter left after the distillation in glass vessels, though not used in medicine, would doubtless prove a serviceable detergent saponaceous acid; and in this light stands recommended by Boerhaave.

Concentrated vinegar. Succ.

Let white wine vinegar be frozen in a wooden vessel in cold winter weather; and let the fluid separated from the ice be preserved for use. It may be considered as sufficiently strong, if one dram of it be capable of saturating a scruple of the fixed vegetable alkali.

This is a very easy mode for obtaining the acid of vinegar in a concentrated state, and freed from a considerable portion of its water. But at the same time we do not thus obtain the acid either so much concentrated, or in so pure a state as by the following process.

Acetous acid. L.

Take of verdegrise, in coarse powder, two pounds. Dry it perfectly by means of a water-bath saturated with sea-salt; then distil it in a sand-bath, and after that distil the liquor. Its specific gravity is to that of distilled water as 1050 to 1000.

By this process, it may be readily concluded that we obtain the acetous acid in its most concentrated state, and with the least admixture of water. And after the re-distillation, it may also be supposed that it will be free from all mixture of the copper. But the internal use of it has been objected to by some, on the supposition that it may still retain a portion of the metal; and hitherto it has, we believe, been but little employed.

Crystallized acid of tartar. Succ.

Take of prepared chalk, frequently washed with warm water, two pounds; spring water, 32 pounds. After slight boiling, by degrees add of cream of tartar 7 pounds, or as much as is sufficient for saturation. Removing the vessel from the fire, let it stand for half an hour, then cautiously pour off the clear liquor into a glass vessel. Wash the residuum or tartareous selenites by pouring water on it three or four times. To this residuum afterwards add of weak vitriolic acid 16 pounds, let it be digested for a day, frequently stirring it with a wooden spatula. After this pour the acid liquor into a glass vessel: but with the residuum mix 16 pounds of spring water; strain it through paper, and again pour water on the residuum till it become insipid. Let the acid liquors mixed together in a glass vessel be boiled to the consistence of a thin syrup; which being strained, must be set apart for the formation of crystals. Let the crystals collected after repeated distillations

be dried on paper, and afterwards kept in a dry place.

If before crystallization a little of the inspissated acid liquor be diluted with four times its quantity of pure water, and a few drops of vinegar of litharge be put into it, a white sediment will immediately be deposited. If a few drops of the diluted nitrous acid be then added, the mixture will become limpid, if the tartareous liquor be pure and entirely free from the vitriolic acid; but if it be not, it will become white. This fault, however, may be corrected, if the acid of tartar be diluted with six pounds of water and a few ounces of the tartareous selenites be added to it. After this it may be digested, strained, and crystallized.

By this process, the acid of tartar may be obtained in a pure solid form. It would, however, be perhaps an improvement of the process, if quicklime were employed in place of chalk. For Dr Black has found that quicklime absorbs the whole of the tartareous acid, and then the supernatant liquor contains only the alkaline part of the tartar; whereas, when chalk is employed, it contains a solution of soluble tartar, the chalk taking up only the superabundant acid. By this method then a greater quantity of tartareous acid might be obtained from the sediment. The tartareous acid has not hitherto been much employed in its pure state. But besides being useful for some purposes in medicine, for which the cream of tartar is at present in use, and where that supersaturated neutral may be less proper, there is also reason to suppose, that from the employment of the pure acid, we should arrive at more certainty in the preparation of the antimonium tartarizatum, or tartar emetic, than by employing the cream of tartar, the proportion of acid in which varies very much from different circumstances. The pure acid of tartar might also probably be employed with advantage for bringing other metallic substances to a saline state.

Distilled acid of tartar. Succ.

Let pounded crude tartar be put into a tubulated earthen or iron retort till it fills about two-thirds of it, and let distillation be performed by gradually increasing the heat. Into the recipient, which should be very large, an acid liquor will pass over together with the oil; which being separated from the oil, must again be distilled from a glass retort. If the residuum contained in the earthen or iron retort be diluted with water, strained through paper, and boiled to dryness, it gives what is called the *alkali* of tartar. If this do not appear white, it may be made so by burning, solution, straining, and evaporation.

This is another mode of obtaining both the acid and alkali of tartar in a pretty pure state; and, as well as the former, it is not unworthy of being adopted into our pharmacopœias.

Aerated water. Ross.

Let spring water be saturated with the fixed air, or aerial acid, arising from a solution of chalk in vitriolic acid, or in any similar acid. Water may also be impregnated by the fixed air rising from fermenting liquors.

The aerial acid, on which we have already had occasion

Preparations and Compositions.

to make some observations, besides the great influence which it has as affecting different saline bodies into whose composition it enters, is also frequently employed in medicine, with a view to its action on the human body. The late ingenious Dr Dobson, in his Commentary on Fixed Air, has pointed out many purposes for which it may be usefully employed, and several different forms under which it may be used. But there is no form under which it is at present more frequently had recourse to than that of aerated or mephitic water, as it has often been called. And although not yet received either into the London or Edinburgh pharmacopœias, it is daily employed in practice, and is we think justly intitled to a place among the saline preparations.

The most convenient mode of impregnating water with the aerial acid, and thus having it in our power to exhibit that acid as it were in a diluted state, is by means of a well known and sufficiently simple apparatus, contrived by that ingenious philosopher Dr Nouth. Such a machine ought, we think, to be kept in every shop for the more ready preparation of this fluid. Water properly impregnated with the aerial acid has an agreeable acidulous taste. It is often employed with great advantage in the way of common drink, by those who are subjected to stomach complaints, and by calculous patients. But, besides this, it furnishes an excellent vehicle for the exhibition of many other medicines.

Besides the simple aerated water, the Pharmacopœia Rossica contains also an aqua aëris fixi martialis, or ferruginous aerated water. This is prepared by suspending iron wires in that water till the water be fully saturated with the metal. And in consequence of this acid, simple water becomes a menstruum both for different metallic and earthy substances. But water in this state may be considered rather as fitted for those purposes for which chalybeates are in use, than as a preparation of the aerial acid.

Salt and oil of amber. L.

- 206 Take of amber two pounds. Distil in a sand heat, gradually augmented: an acid liquor, oil, and salt impregnated with oil, will ascend.

On this article we have already offered some observations under the head of Essential Oils. The directions here given by the London college differ chiefly from those of the Edinburgh college formerly mentioned, in no sand being employed: But when care is taken that the sand be pure, it can give no improper impregnation to the medicine, and may prevent some inconveniences in the distillation, particularly that of the amber rising in substance into the receiver.

Purified salt of amber. L.

- 207 Take of salt of amber half a pound; distilled water, one pint. Boil the salt in the distilled water, and set aside the solution to crystallize.

Salt of amber, when perfectly pure, is white, of an acid taste, and not ungrateful. It requires, for its solution, of cold water, in summer, about twenty times its weight; and of boiling water about twice its weight; it is scarcely soluble in rectified spirit without the assistance of heat.

It is given as a cooling diuretic in doses of a few grains, and also in hysterical complaints.

Flowers of benzoin.

Take of benzoin, in powder, one pound. Put it into an earthen pot, placed in sand; and, with a slow fire, sublime the flowers into a paper cone fitted to the pot.

If the flowers be of a yellow colour, mix them with white clay, and sublime them a second time. *L.*

Put any quantity of powdered benzoin into an earthen pot, to which, after fitting it with a large conical paper cap, apply a gentle heat that the flowers may sublime. If the flowers be impregnated with oil, let them be purified by solution in warm water and crystallization. *E.*

Benzoin, exposed in a retort to a gentle fire, melts, and sends up into the neck white, shining crystalline flowers, which are followed by an oily substance. These flowers, which are at present considered as a peculiar acid, are by some termed *acidum benzoicum*. On raising the heat a little (a recipient being applied to the neck of the retort), a thin yellowish oil comes over, intermingled with an acid liquor, and afterwards a thick butyraceous substance: this last, liquefied in boiling water, gives out to it a considerable quantity of saline matter (separable by filtration and proper exhalation), which appears in all respects similar to the flowers.

It appears, therefore, that the whole quantity of flowers which benzoin is capable of yielding, cannot be obtained by the above processes, since a considerable portion arises after the time of their being discontinued. The greatest part of the flowers arise with a less degree of heat than what is necessary to elevate the oil; but if the operation be hastily conducted, or if the fire be not exceedingly gentle, the oil will arise along with the flowers, and render them foul. Hence in the way of trade, it is extremely difficult to prepare them of the requisite whiteness and purity; the heat which becomes necessary, when large quantities of the benzoin are employed, being so great as to force over some of the oil along with them.

In order, therefore, to obtain these flowers in perfection, only a small quantity of benzoin should be put into the vessel at a time; and that this may not be any impediment to the requisite dispatch, a number of shallow, flat-bottomed, earthen dishes may be employed, each fitted with another vessel inverted over it, or a paper cone. With these you may fill a sand furnace; having fresh dishes charged in readiness to replace those in the furnace, as soon as the process shall appear finished in them: the residuum of the benzoin should be scraped out of each of the vessels before a fresh parcel be put in.

These flowers, when made in perfection, have an agreeable taste and fragrant smell. They readily dissolve in spirit of wine; and likewise, by the assistance of heat, in water; but separate again from the latter upon the liquor's growing cold, shooting into saline spicula, which unite together into irregular masses. By the mediation of sugar they remain suspended in cold water, and thus form an elegant balsamic syrup. Some have held them in great esteem as pectoral and sudorific

sudorific, in the dose of half a scruple or more: but at present they are rarely used, on account of the offensive oil which, as usually prepared, they are tainted with, and from which a fresh sublimation from tobacco-pipe clay, as formerly practised, did not free them so effectually as might be wished. The observations above related, point out the method of depurating them more perfectly, viz. by solution, filtration, and crystallization.

They enter the composition of the paregoric elixir, or tinctura opii camphorata, as it is now called.

Salt of tartar. E.

Take of tartar, what quantity you please. Roll it up in a piece of moist bibulous paper, or put it into a crucible, and surrounding it with live coals, burn it to a coal; next, having beat this coal, calcine it in an open crucible with a moderate heat, taking care that it do not melt, and continue the calcination till the coal becomes of a white, or at least of an ash, colour. Then dissolve it in warm water; strain the liquor through a cloth, and evaporate it in a clean iron vessel; diligently stirring it towards the end of the process with an iron spatula, to prevent it from sticking to the bottom of the vessel. A very white salt will remain, which is to be left a little longer on the fire, till the bottom of the vessel becomes almost red. Lastly, when the salt is grown cold, let it be put up in glass vessels well shut.

Native tartar is a saline substance, compounded of an acid, of a fixed alkali, and of oily, viscous, and colouring matter. The purpose of the above process is, to free it from every other matter but the fixed alkali. From the mistaken notion that tartar was essentially an acid mixed only with impurities, it has been generally supposed that the effect of this operation was the conversion of an acid into an alkali by means of heat. But since Mr Scheele has discovered that the proper matter of tartar, freed from the oily and colouring parts, is really a salt compounded of an acid, which is predominant, and a fixed alkali, we have no farther need of such an obscure theory. The acid of the tartar by this process is dissipated by means of the heat: and the oily, viscous, and colouring matters, are partly dissipated, and partly brought to the state of insoluble earthy matter, easily separable by the future lixiviation from the alkali, wherewith they were loosely combined. But by the last of these processes, something farther is carried on than the separation of the more palpable foreign matters. By allowing the salt, freed from the water of the lixivium, to remain on the fire till the bottom of the vessel become almost red, any oily matter that may still be present seems to be decomposed by the united action of the heat and fixed alkali, forming with a part of the latter, by their reciprocal action, a volatile alkaline salt, which is forthwith discharged in elastic vapours. Besides the complete discharge of the above principles, the remaining fixed alkali also suffers a considerable loss of its fixed air, or aerial acid; with which, when fully saturated, it forms the imperfect neutral salt, denominated by Dr Black *mild fixed alkali*: on this account it is somewhat caustic, considerably deliquescent, and in proportion to its possessing these properties more or less, it more or less nearly approaches to the state of pure alkali. It is not, how-

ever, so effectually deprived of fixed air as to be sufficiently caustic for a number of purposes. Where causticity is not required, the salt thus purified is abundantly fit for most pharmaceutical purposes; but as native tartar generally contains small portions of neutral salts besides the foreign matters already noticed, it is necessary, if we wish to have a very pure alkali for medicinal operations, to employ crystallization and other means, beside the process here directed.

The white and red sorts of tartar are equally fit for the purpose of making fixed salt; the only difference is, that the white affords a somewhat larger quantity than the other: from 16 ounces of this sort, upwards of four ounces of fixed alkaline salt may be obtained. The use of the paper is to prevent the smaller pieces of the tartar from dropping down into the ash-hole, through the interstices of the coals, upon first injecting it into the furnace.

The calcination of the salt (if the tartar was sufficiently burnt at first) does not increase its strength so much as is supposed: nor is the greenish or blue colour any certain mark either of its strength, or of its having been, as was formerly supposed, long exposed to a vehement fire: for if the crucible be perfectly clean, close covered, and has stood the fire without cracking, the salt will turn out white, though kept melted and reverberated ever so long; while, on the other hand, a slight crack happening in the crucible, or a spark of coal falling in, will in a few minutes give the salt the colour admired. The colour, in reality, is a mark rather of its containing some inflammable matter than of its strength.

The vegetable alkali prepared from tartar has now no place in the London pharmacopœia, or at least it is included under the following article.

Prepared kali. L.

Take of pot-ash, two pounds; boiling distilled water, three pints. Dissolve and filtre through paper; evaporate the liquor till a pellicle appears on the surface; then set it aside for a night, that the neutral salts may crystallize; after which pour out the liquor, and boil away the whole of the water, constantly stirring, lest any salt should adhere to the pot. In like manner is purified impure kali from the ashes of any kind of vegetable. The same salt may be prepared from tartar burnt till it becomes of an ash colour.

Fixed vegetable alkaline salt purified. E.

Let the fixed alkaline salt, called in English *pearl-ashes*, be put into a crucible, and brought to a somewhat red heat, that the oily impurities, if there be any, may be consumed; then having beat and agitated it with an equal weight of water, let them be well mixed. After the feces have subsided, pour the ley into a very clean iron pot, and boil to dryness, diligently stirring the salt towards the end of the process, to prevent its sticking to the vessel. This salt, if it hath been rightly purified, though it be very dry, if rubbed with an equal weight of water, may be dissolved into a liquor void of colour or smell.

The pot used in commerce is an alkali mixed with a considerable quantity of remaining charcoal, U u sulphur,

sulphur, vitriolated tartar, and oily matter. In the large manufactures, the alkaline part is indeed considerably freed from impurities by mixing the weed-ashes with water, evaporating the clear ley, and burning the residuum in an oven; but besides that this process is insufficient for the complete separation of the impurities, it also superadds a quantity of stony matter, giving to the alkali the *pearl* appearance (whence its name), and rendering it altogether unfit for pharmaceutical purposes. By the process here directed, the alkali is effectually freed from all these heterogeneous matters, excepting perhaps a small proportion of vitriolated tartar, or other neutral salts, which may very generally be neglected. As in the process no after calcination is directed, it is probable that the fixed alkali thus prepared will not prove so caustic, that is to say, is not so considerably deprived of fixed air, as in the process directed for preparing the salt of tartar. It is, however, sufficiently pure for most purposes: and we consider the above process as the most convenient and cheap method of obtaining the vegetable fixed alkali in its mild state.

The purified vegetable alkali has been known in our pharmacopœias under the different names of *salt of seaweed*, *salt of tartar*, &c. But all these being now known to be really the same, the terms, as leading to error, have been with justice expunged; and it has been a desideratum to discover some short name equally applicable to the whole. The term employed by the Edinburgh college is too long, being rather a description than a name; but to that employed by the London college, *Kali*, objections have also been made. And it must be allowed, that besides the inconvenience which arises from its being an indeclinable word, the fossil alkali is equally intitled to the same appellation. Besides this, as a considerable portion of the fossil alkali is prepared from burning a vegetable growing on the sea-coasts, which has the name of *kali*, the *Kali spinosum* of Linné, some apparent contradiction and ambiguity may thence arise. And the London college would perhaps have done better, if they had adopted the term *Potassa*; a name which has been appropriated to this salt by some of the most eminent modern chemists.

The purified potassa is frequently employed in medicine, in conjunction with other articles, particularly for the formation of saline neutral draughts and mixtures: But it is used also by itself in doses from three or four grains to 15 or 20; and it frequently operates as a powerful diuretic, particularly when aided by proper dilution. See *PEARL-ASH* and *POT-ASH*.

Water of kali. L.

- 212 Take of kali, one pound, set it by in a moist place till it be dissolved, and then strain it.

This article had a place in former editions of our pharmacopœias under the titles of *ley of tartar*, or *oil of tartar per deliquium*, &c. It is, however, to be considered as a mere watery solution of the mild vegetable alkali, formed by its attracting moisture from the air; and therefore it is with propriety styled the *water of kali*.

The solutions of fixed alkaline salts, made by exposing them to a moist air, are generally considered

as being purer than those made by applying water directly: for though the salt be repeatedly dissolved in water, filtered, and exsiccated; yet, on being li-quefied by the humidity of the air, it will still deposite a portion of earthy matter: but it must be observed, that the exsiccated salt leaves always an earthy matter on being dissolved in water, as well as on being deliquescent in the air. Whether it leaves more in the one way than in the other, is not determined with precision. The deliquescent lixivium is said to contain nearly one part of alkaline salt to three of an aqueous fluid. It is indifferent, in regard to the lixivium itself, whether the white ashes of tartar, or the salt extracted from them, be used; but as the ashes leave a much greater quantity of earth, the separation of the ley proves more troublesome.

The water of kali of the present edition of the London pharmacopœia, then, may be considered as an improvement of the lixivium tartari of their former edition. But the Edinburgh college, considering this solution as being in no respect different from that made by pure water, have entirely rejected this preparation from their pharmacopœia, and probably with justice.

Water of pure kali. L.

Take of kali, four pounds; quicklime, six pounds; distilled water, four gallons. Put four pints of water to the lime, and let them stand together for an hour; after which, add the kali and the rest of the water; then boil for a quarter of an hour: suffer the liquor to cool, and strain. A pint of this liquor ought to weigh 16 ounces. If the liquor effervesces with any acid, add more lime.

A preparation similar to this had a place in the former edition of the London pharmacopœia, under the title of *soap-ley*. Quicklime, by depriving the mild alkali of its aerial acid, renders it caustic; hence this ley is much more acrimonious, and acts more powerfully as a menstruum of oils, fats, &c. than a solution of the potassa alone. The lime should be used fresh from the kiln; by long keeping, even in close vessels, it loses its strength: such should be made choice of as is thoroughly burnt or calcined, which may be known by its comparative lightness.

All the instruments employed in this process should be either of wood, earthen ware, or glass: the common metallic ones would be corroded by the ley, so as either to discolour or communicate disagreeable qualities to it. If it should be needful to filter or strain the liquor, care must be taken that the filter or strainer be of vegetable matter: woollen, silk, and that sort of filtering paper which is made of animal substances, are quickly corroded and dissolved by it.

The liquor is most conveniently weighed in a narrow-necked glass bottle, of such a size, that the measure of a wine pint may arise some height into its neck; the place to which it reaches being marked with a diamond. A pint of the common leys of our soap-makers weighs more than 16 ounces: it has been found that their soap-ley will be reduced to the standard here proposed, by mixing it with something less than an equal measure of water.

Although this liquor is indeed pure alkali dissolved in water, yet we are inclined to give the preference

to the name employed by the Edinburgh college, as well as to the modes of preparing it, directed in the following formula.

Cautic ley. E.

Take of fresh burnt quicklime, eight ounces; purified fixed vegetable alk. line salt, six ounces. Throw the quicklime, with 28 ounces of warm water, into an iron or earthen vessel. The ebullition and extinction of the lime being perfectly finished, instantly add the alkaline salt; and having thoroughly mixed them, shut the vessel till it cools. Stir the cooled matter, and pour out the whole into a glass funnel, whose throat must be stopped up with a piece of clean rag. Let the upper mouth of the funnel be covered, while the tube of it is inserted into a glass vessel, so that the ley may gradually drop through the rag into that vessel. When it first gives over dropping, pour into the funnel some ounces of water; but cautiously, and in such a manner, that the water shall swim above the matter. The ley will again begin to drop, and the affusion of water is to be repeated in the same manner, until three pounds have dropped, which takes up the space of two or three days; then agitating the superior and inferior parts of the ley together, mix them, and put up the liquor in a well shut vessel.

If the ley be rightly prepared, it will be void of colour or smell: nor will it raise an effervescence with acids, except perhaps a very slight one. Colour and sour denote the salt not sufficiently calcined; and effervescence, that the quicklime has not been good.

The reasons and propriety of the different steps in the above process will be best understood by studying the theory on which it is founded. The principle of mildness in all alkaline salts, whether fixed or volatile, vegetable or fossil, is very evidently fixed air, or the aerial acid: But as quicklime has a greater attraction for fixed air than any of these salts, so if this substance be presented to any of them, they are thereby deprived of their fixed air, and forthwith become caustic. This is what precisely happens in the above processes. The propriety of closely shutting the vessels through almost every step of the operation, is sufficiently obvious; viz. to prevent the absorption of fixed air from the atmosphere, which might defeat our intentions. When only a piece of cloth is put into the throat of the funnel, the operation is much more tedious, because the pores of the cloth are soon blocked up with the wet powdery matter. To prevent this, it may be convenient to place above the cloth a piece of fine Fly's wirework; but as metallic matters are apt to be corroded, the method used by Dr Black is the most eligible. The Doctor first drops a rugged stone into the tube of the funnel, in a certain place of which it forms itself a firm bed, while the inequalities on its surface afford interstices of sufficient size for the passage of the filtering liquor. On the upper surface of this stone he puts a thin layer of lint or clean tow; immediately above this, but not in contact with it, he drops a stone similar to the former, and of a size proportioned to the swell in the

upper part of the tube of the funnel. The interstices between this second stone and the funnel are filled up with stones of a less dimension, and the gradation uniformly continued till pretty small sand is employed. Finally, this is covered with a layer of coarser sand and small stones to sustain the weight of the matter, and to prevent its being inviscated in the minute interstices of the fine sand. The throat of the funnel being thus built up, the stony fabric is to be freed of clay and other adhering impurities, by making clean water pass through it till the water comes clear and transparent from the extremity of the funnel. It is obvious, that in this contrivance, the author has, as usual, copied nature in the means she employs to depurate watery matters in the bowels of the earth; and it might be usefully applied for the filtration of various other fluids.

It is a very necessary caution to pour the water gently into the funnel; for if it be thrown in a forcible stream, a quantity of the powdery matter will be washed down, and render all our previous labour useless. That part of the ley holding the greatest quantity of salt in solution will no doubt be heaviest, and will consequently sink lowest in the vessel: the agitation of the ley is therefore necessary, in order to procure a solution of uniform strength through all its parts. If the salt has been previously freed of oily and other inflammable matters, this ley will be colourless and void of smell. If the quicklime has been so effectually deprived of its own fixed air, as to be able to absorb the whole of that in the alkali, the ley will make no effervescence with acids, being now deprived of fixed air, to the discharge of which by acids this appearance is to be ascribed in the mild or aerated alkalis.

The caustic ley is therefore to be considered as a solution of pure alkali in water. See the article *FIXED AIR*.

It may be proper to observe, for the sake of understanding the whole of the theory of the above process, that while the alkali has become caustic, from being deprived of fixed air by the quicklime, the lime has in its turn become mild and insoluble in water from having received the fixed air of the alkali.

The caustic ley, under various pompous names, has been much used as a lithontriptic; but its fame is now beginning to decline. In acidities in the stomach, attended with much flatulence and laxity, the caustic ley is better adapted than mild alkalis; as in its union with the acid matter it does not separate air. When covered with mucilaginous matters, it may be safely taken into the stomach: and by stimulating, it coincides with the other intentions of cure; by some dyspeptic patients it has been employed with advantage.

Pure kali. L.

Take of water of pure kali, one gallon. Evaporate it to dryness; after which let the salt melt on the fire, and pour it out.

The strongest common caustic. E.

Take of caustic ley, what quantity you please. Evaporate it in a very clean iron vessel on a gentle fire till,

till, on the ebullition ceasing, the saline matter gently flows like oil, which happens before the vessel becomes red. Pour out the caustic thus liquefied on a smooth iron plate; let it be divided into small pieces before it hardens, which are to be kept in well shut phials.

These preparations may be considered as differing in no essential particular. But the directions given by the Edinburgh college are the most precise and distinct.

The effect of the above processes is simply to discharge the water of the solution, whereby the causticity of the alkali is more concentrated in any given quantity. These preparations are strong and sudden caustics. The caustic prepared in this way has an inconvenience of being apt to liquefy too much on the part to which it is applied, so that it is not easily confined within the limits in which it is intended to operate; and indeed the suddenness of its action depends on this disposition to liquefy.

Lime with pure kali. L.

- 217 Take of quicklime, five pounds and four ounces; water of pure kali, 16 pounds by weight. Boil away the water of pure kali to a fourth part; then sprinkle in the lime, reduced to powder by the effusion of water. Keep it in a vessel close stopped.

The milder common caustic. E.

- 218 Take of caustic ley, what quantity you please. Evaporate in an iron vessel till one-third remains; then mix with it as much new slaked quicklime as will bring it to the consistence of pretty solid pap, which is to be kept in a vessel closely stopped.

These preparations do not essentially differ from each other, while the chief difference between the present formula and that which stood in the last edition of the London pharmacopœia is in the name. It was then styled the *strongest common caustic*.

Here the addition of lime in substance renders the preparation less apt to liquefy than the foregoing, and consequently it is more easily confinable within the intended limits, but proportionally slower in its operation. The design of keeping or of slaking the lime is, that its acrimony may be somewhat abated.

Exposed long to the air, these preparations gradually resume their power of effervescence, and lose proportionally the additional activity which the quicklime had produced in them.

Prepared natron. L.

- 219 Take of barilla, powdered, two pounds; distilled water, one gallon. Boil the barilla in four pints of water for half an hour, and strain. Boil that part which remains after straining with the rest of the water, and strain. Evaporate the mixed liquors to two pints, and set them by for eight days; strain this liquor again; and, after due boiling, set it aside to crystallize. Dissolve the crystals in distilled water; strain the solution, boil, and set it aside to crystallize.

The name of *natron*, here used by the London college for the fixed fossil alkali, has, as well as their name for the vegetable alkali, been objected to. And though they are here supported by the authority of

the ancients, yet perhaps they would have done better in following the best modern chemists by employing the term *salt of soda*. This article differs in name only from the following.

Fixed fossil alkaline salt purified. E.

Take of ashes of Spanish kali, commonly called *soda* or *barilla*, as much as you please. Bruise them; then boil in water till all the salt be dissolved. Strain this through paper, and evaporate in an iron vessel, so that after the liquor has cooled the salt may concreate into crystals.

By the above processes, the fossil alkali is obtained sufficiently pure, being much more disposed to crystallize than the vegetable alkali; the admixture of this last, objected to by Dr Lewis, is hereby in a great measure prevented.

It is with great propriety, that in this, as well as many other processes, the London college direct the use of distilled water, as being free from every impregnation.

The natron, or fossil alkali, is found lying on the ground in the island of Teneriff, and some other countries. The native productions of this salt seem to have been better known to the ancients than to late naturalists; and it is, with good reason, supposed to be the nitre of the Bible. How far the native natron may supersede artificial means to procure it from mixed bodies, we have not been able to learn with certainty.

The fossil alkali is not only a constituent of different neutrals, but is also sometimes employed as a medicine by itself. And in its purified state it has been by some reckoned useful in affections of the scrofulous kind. See NATRUM.

Prepared ammonia. L.

Take of sal ammoniac, powdered, one pound; prepared chalk, two pounds. Mix and sublime.

Water of ammonia. L.

Take of sal ammoniac, one pound; pot-ash, one pound and a half; water, four pints. Draw off two pints, by distillation, with a slow fire.

Volatile alkali from sal ammoniac, commonly called volatile sal ammoniac.

Take of sal ammoniac, one pound; chalk, very pure and dry, two pounds; mix them well, and sublime from a retort into a refrigerated receiver.

Spirit of sal ammoniac. E.

Take sal ammoniac, purified vegetable fixed alkali, of each sixteen ounces; water, two pounds. Having mixed the salts, and put them into a glass retort, pour in the water; then distil to dryness with a sand-bath, gradually raising the heat.

These articles, which in the last edition of the London pharmacopœia were styled the *volatile salt and spirit of sal ammoniac*, were then directed to be prepared in the same manner.

Sal ammoniac is a neutral salt, composed of volatile alkali and marine acid. In these processes the acid is absorbed by the fixed alkali or chalk; and the volatile alkali is of course set at liberty.

The volatile alkali is, however, in its mild state, being

being combined with the fixed air, or discharged from the fixed alkali or chalk on their uniting with the muriatic acid.

The fixed alkali begins to act on the sal ammoniac, and extricates a pungent urinous odour as soon as they are mixed. Hence it is most convenient not to mix them till put into the distilling vessel. The two salts may be dissolved separately in water, the solutions poured into a retort, and a receiver immediately fitted on. An equal weight of the fixed salt is fully, perhaps more than sufficient to extricate all the volatile.

Chalk does not begin to act on the sal ammoniac till a considerable heat be applied. Hence they may be without inconvenience, and indeed ought to be thoroughly mixed together before they are put into the retort. The surface of the mixture may be covered with a little more powdered chalk, to prevent such particles of the sal ammoniac as may happen to lie uppermost from subliming unchanged. Though the fire must here be much greater than when fixed alkaline salt is used, it must not be strong, nor suddenly raised; for if it be, a part of the chalk (though of itself not capable of being elevated by any degree of heat) will be carried up along with the volatile salt. M. du Hamel experienced the justness of this observation. He relates, in the Memoirs of the French Academy of Sciences for the year 1735, that he frequently found his volatile salt, when a very strong fire was used in the sublimation, amount to more, sometimes by a half, than the weight of the crude sal ammoniac employed; and although not three-fourths of this concrete are pure volatile salt, yet the fixed earthy matter, when once volatilized by the alkali, arose along with it again on the gentlest refublimation, dissolved with it in water, and exhaled with it in the air.

When all the salt has sublimed, and the receiver grown cool, it may be taken off, and luted to another retort charged with fresh materials. This process may be repeated till the recipient appears lined with volatile salt to a considerable thickness: the vessel must then be broken in order to get out the salt.

The volatile salt and spirit of sal ammoniac are the purest of all the medicines of this kind. They are somewhat more acrimonious than those produced directly from animal substances, which always contain a portion of the oil of the subject, and receive from thence some degree of a saponaceous quality. These last may be reduced to the same degree of purity by combining them with acids into ammoniacal salts, and afterwards recovering the volatile alkali from these compounds by the processes above directed.

The matter which remains in the retort after the distillation of the spirit, and sublimation of the volatile sal ammoniac, is found to consist of marine acid united with the fixed alkali or chalk employed. When fixed alkaline salt has been used as the intermedium, the residuum, or *caput mortuum* as it is called, yields, on solution and crystallization, a salt exactly similar to the spirit of sea-salt coagulated afterwards described; and hence we may judge of the extraordinary virtues formerly attributed to this salt under the names of *sal antihysericum*, *antihypochondriacum*, *febrifugum*, *digestum Sylvii*, &c.

The *caput mortuum* of the volatile salt, where chalk is employed as an intermedium, exposed to a moist air,

runs into a pungent liquor, which proves nearly the same with a solution of chalk made directly in the marine acid. It is called by some *oleum cretæ*, oil of chalk. If calcined shells, or other animal limes, be mingled with sal ammoniac, a mass will be obtained, which likewise deliquesces in the air, and forms a liquor of the same kind.

Water of pure ammonia. L.

Take of sal ammoniac, one pound; quicklime, two pounds; water, one gallon. Add to the lime two pints of the water. Let them stand together an hour: then add the sal ammoniac and the other six pints of water boiling, and immediately cover the vessel. Pour out the liquor when cold, and distil off with a slow fire one pint. 225

Cautic volatile alkali, commonly called *spirit of sal ammoniac with quicklime.* E.

Take of quicklime, fresh burnt, two pounds; water, one pound. Having put the water into an iron or stone ware vessel, add the quicklime previously beat; cover the vessel for 24 hours; when the lime has fallen into a fine powder, put it into the retort; then add 16 ounces of sal ammoniac, diluted with four times its weight of water; and, shutting the mouth of the retort, mix them together by agitation. Lastly, distil into a refrigerated receiver, with a very gentle heat, so that the operator can easily bear the heat of the retort applied to his hands. Twenty ounces of liquor are to be drawn off. In this distillation the vessels are to be so luted as thoroughly to exclude the vapours, which are very penetrating. After the distillation, however, they are to be opened, and the alkali poured out before the retort hath altogether cooled. 226

The theory of this process is precisely the same with that directed for the preparation of caustic ley. The effect of the quicklime on the sal ammoniac is very different from that of the chalk and fixed alkali in the foregoing process. Immediately on mixture a very penetrating vapour exhales; and in distillation the whole of the volatile salt arises in a liquid form, no part of it appearing in a concrete state, how gently soever the liquor be re-distilled. This spirit is far more pungent than the other both in smell and taste; and, like fixed alkalis rendered caustic by the same intermedium, it raises no effervescence on mixture with acids. The whole of the phenomena are to be ascribed to the absorption of fixed air from the alkali by means of the quicklime; and from being thus deprived of the aerial acid the volatile alkali is brought to a caustic state.

This spirit is held to be too acrimonious for internal use, and has therefore been chiefly employed for smelling to in faintings, &c. though, when properly diluted, it may be given inwardly with safety. It is a powerful menstruum for some vegetable substances, as Peruvian bark, from which the other spirits extract little. It is also most convenient for the purpose of rendering oils miscible with water, as in the preparation of what is called in extemporaneous practice *the emulsion*.

Some have mixed a quantity of this with the official spirits both of sal ammoniac and of hartshorn; which thus become more pungent, so as to bear an addition

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addition of a considerable quantity of water, without any danger of the discovery from the taste or smell. This abuse would be prevented, if what has been formerly laid down as a mark of the strength of these spirits (some of the volatile salt remaining undissolved in them) were attended to. It may be detected by adding to a little of the suspected spirit about one-fourth its quantity or more of rectified spirit of wine; which, if the volatile spirit be genuine, will precipitate a part of its volatile salt, but occasions no visible fermentation or change in the caustic spirit, or in those which are sophisticated with it.

Others have substituted for the spirit of sal ammoniac a solution of crude sal ammoniac and fixed alkaline salt mixed together. This mixture deposits a white matter on the addition of spirit of wine, like the genuine spirit; from which, however, it may be distinguished, by the salt which is thus separated not being a volatile alkali, but a fixed neutral salt. The abuse may be more readily detected by a drop or two of solution of silver in aquafortis, which will produce no change in the appearance of the true spirit, but will render the counterfeit turbid and milky.

The volatile liquor, salt, and oil, of hartshorn. L.

227 Take of hartshorn, ten pounds. Distil with a fire gradually increased. A volatile liquor, salt, and oil, will ascend. The oil and salt being separated, distil the liquor three times. To the salt add an equal weight of prepared chalk, and sublime thrice, or till it become white.

The same volatile liquors, salt, and oil, may be obtained from any parts (except the fat) of all kinds of animals.

The volatile alkali obtained from hartshorn, whether in a solid or fluid state, is precisely the same with that obtained from sal ammoniac. And as that process is the easiest, the Edinburgh college have entirely rejected the present. While, however, the names of spirit and salt of hartshorn are still in daily use, ammonia, or the volatile alkali, is still prepared from bones and other animal substances by several very extensive traders.

The wholesale dealers have very large pots for the distillation of hartshorn, with earthen heads almost like those of the common still; for receivers, they use a couple of oil jars, the mouths of which are luted together; the pipe that comes from the head enters the lowermost jar through a hole made on purpose in its bottom. When a large quantity of the subject is to be distilled, it is customary to continue the operation for several days successively; only unluting the head occasionally to put in fresh materials.

When only a small quantity of spirit or salt is wanted, a common iron pot, such as is usually fixed in sand furnaces, may be employed, an iron head being fitted to it. The receiver ought to be large, and a glass, or rather tin adpater, inserted between it and the pipe of the head.

The distilling vessel being charged with pieces of the horn, a moderate fire is applied, which is slowly increased, and raised at length almost to the utmost degree. At first a watery liquor arises, the quantity of which will be smaller or greater according as the horns were more or less dry: this is succeeded by the salt and oil: the salt at first dissolves as it comes over in

the phlegm, and thus forms what is called *spirit*. When the phlegm is saturated, the remainder of the salt concretes in a solid form to the sides of the recipient. If it be required to have the whole of the salt solid and undissolved, the phlegm should be removed as soon as the salt begins to arise, which may be known by the appearance of white fumes; and that this may be done the more commodiously, the receiver should be left unluted till this first part of the process be finished. The white vapours which now arise sometimes come with such vehemence as to throw off or burst the receiver. To prevent this accident, it is convenient to have a small hole in the luting, which may be occasionally stopped with a wooden peg, or opened, as the operator shall find proper. After the salt has all arisen, a thick dark-coloured oil comes over. The process is now to be discontinued; and the vessels, when grown cold, unluted.

All the liquid matters being poured out of the receiver, the salt which remains adhering to its sides is to be washed out with a little water and added to the rest. It is convenient to let the whole stand for a few hours, that the oil may the better disengage itself from the liquor, so as to be first separated by a funnel, and afterwards more perfectly by filtration through wet paper. The salt and spirits are then to be farther purified as above directed.

The spirit of hartshorn met with in the shops is extremely precarious in point of strength; the quantity of salt contained in it (on which its efficacy depends) varying according as the distillation in rectifying it is continued for a longer or shorter time. If after the volatile salt has arisen, so much of the phlegm or watery part be driven over as is just sufficient to dissolve it, the spirit will be fully saturated, and as strong as it can be made. If the process be not at this instant stopped, the phlegm, continuing to arise, must render the spirit continually weaker and weaker. The distillation therefore ought to be discontinued at this period, or rather while some of the salt still remains undissolved; the spirit will thus prove always equal, and the buyer be furnished with a certain criterion of its strength. Very few have taken any notice of the above-mentioned inconvenience of these kinds of spirits; and the remedy is first hinted at in the *Pharmacopæia Reformata*. The purity of the spirit is easily determined from its clearness and grateful odour.

Volatile alkaline salts, and their solutions called *spirits*, agree in many respects with fixed alkalis, and their solutions or leys: as in changing the colour of blue flowers to a green; effervescing, when in their mild state, with and neutralizing acids; liquefying the animal juices; and corroding the fleshy parts, so as, when applied to the skin, and prevented from exhaling by a proper covering, to act as caustics; dissolving oils and sulphur, though less readily than the fixed alkalis, on account probably of their not being able to bear any considerable heat, by which their activity might be promoted. Their principal difference from the other alkalis seems to consist in their volatility. They exhale or emit pungent vapours in the coldest state of the atmosphere; and by their stimulating smell they prove serviceable in languors and faintings. Taken internally, they discover a greater colliquating as well as stimulating power; the blood drawn from a vein,

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vein, after their use has been continued for some time, is said to be remarkably more fluid than before; they are likewise more disposed to operate by perspiration, and to act on the nervous system. They are particularly useful in lethargic cases; in hysterical and hypochondriacal disorders; and in the languors, headaches, inflations of the stomach, flatulent colics, and other symptoms which attend them. They are generally found more serviceable to aged persons, and in phlegmatic habits, than in the opposite circumstances. In some fevers, particularly those of the low kind, accompanied with a cough, hoarseness, and a redundancy of phlegm, they are of great utility, raising the *vis vitæ*, and exciting a salutary diaphoresis; but in putrid fevers, feurries, and wherever the mass of blood is thin and acrimonious, their use is ambiguous. As they are more powerful than the fixed in liquefying tenacious humours, so they prove more hurtful where the fluids are already in a colliquated state. In vernal intermittents, particularly those of the slow kind, they are often the most efficacious remedy. Dr Bisset observes, in his Essay on the Medical Constitution of Great Britain, that though many cases occur which will yield to no other medicine than the bark, yet he has met with many which were only suppressed from time to time by the bark, but were completely cured by alkaline spirits. He tells us, that these spirits will often carry off vernal intermittents without any previous evacuation: but that they are generally more effectual if a purge be premised; and in plethoric or inflammatory cases, or where the fever personates a remittent, venesection is necessary.

These salts are most commodiously taken in a liquid form, largely diluted; or in that of a bolus, which should be made up only as it is wanted. The dose is from a grain or two to ten or twelve. Ten drops of a well made spirit, or saturated solution, are reckoned to contain about a grain of the salt. In intermittents, 15 or 20 drops of the spirit are given in a tea-cupful of cold spring water, and repeated five or six times in each intermission.

The volatile salts and spirits prepared from different animal substances, have been supposed capable of producing different effects on the human body, and to receive specific virtues from the subject. The salt of vipers has been esteemed particularly serviceable in disorders occasioned by the bite of that animal; and a salt drawn from the human skull, in diseases of the head. But modern practice acknowledges no such different effects from these preparations; and chemical experiments have shown their identity. There is indeed, when not sufficiently purified, a very perceptible difference in the smell, taste, degree of pungency, and volatility of these salts; and in this state their medicinal virtues vary considerably enough to deserve notice: but this difference they have in common, according as they are more or less loaded with oil, not as they are produced from this or that animal substance. As first distilled, they may be looked on as a kind of volatile soap, in which the oil is the prevailing principle; in this state they have much less of the proper alkaline acrimony and pungency than when they have undergone repeated distillations, and such other operations as disengage the oil from the salt; for by these means they lose their saponaceous quality,

and acquiring greater degrees of acrimony, become medicines of a different class. These preparations therefore do not differ near so much from each other, as they do from themselves in different states of purity. To which may be added, that when we consider them as loaded with oil, the virtues of a distilled animal oil itself are likewise to be brought into the account.

These oils, as first distilled, are highly fetid and offensive, of an extremely heating quality, and of such activity, that, according to Hoffman's account, half a drop dissolved in a dram of spirit of wine is sufficient to raise a copious sweat. By repeated rectifications, they lose their offensiveness, and at the same time become mild in their medicinal operation. The rectified oils may be given to the quantity of twenty or thirty drops, and are said to be anodyne and antispasmodic, to procure a calm sleep and gentle sweat, without heating or agitating the body, as has been observed in treating of the animal oil. It is obvious, therefore, that the salts and spirits must differ, not only according to the quantity of oil they contain, but according to the quality of the oil itself in its different states.

The volatile salt and spirits, as first distilled, are of a brown colour, and a very offensive smell: by repeated rectification, as directed in the processes above set down, they lose great part of the oil on which these qualities depend, the salt becomes white, the spirit limpid as water, and of a grateful odour; and this is the mark of sufficient rectification.

It has been objected to the repeated rectification of these preparations, that, by separating the oil, it renders them similar to the pure salt and spirit of sal ammoniac, which are procurable at an easier rate. But the intention is not to purify them wholly from the oil, but to separate the grosser part, and to subtilize the rest, so as to bring it towards the same state as when the oil is rectified by itself. The rectification of spirit of hartshorn has been repeated twenty times successively, and found still to participate of oil, but of an oil very different from what it was in the first distillation.

The rectified oils, in long-keeping, become again fetid. The salts and spirits also, however carefully rectified, suffer in length of time the same change; resuming their original brown colour and ill smell; a proof that the rectification is far from having divested them of oil. Any intentions, however, which they are thus capable of answering, may be as effectually accomplished by a mixture of the volatile alkali with the animal oil, in its rectified state, to any extent that may be thought necessary.

Vitriolated salt. L.

Take of the salt which remains after the distillation of the nitrous acid, two pounds. Distilled water, two gallons. Burn out the superfluous acid with a strong fire in an open vessel; then boil it a little while in the water; strain and set the liquor aside to crystallize.

The salt thus formed is the same with the vitriolated tartar of the last edition of the London pharmacopœia; but it is now prepared in a cheaper and easier manner, at least for those who distil the nitrous acid. In both ways a neutral is formed, consisting of the fixed and

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table alkali, united to the vitriolic acid. But a similar compound may also be obtained by the following process of the Edinburgh pharmacopœia

Vitriolated fixed vegetable alkali, commonly called *vitriolated tartar*. E.

- 229 Take of vitriolic acid, diluted with six times its weight of water, as much as you please. Put it into a capacious glass vessel, and gradually drop into it, of purified fixed vegetable alkali, diluted with six times its weight of water, as much as is sufficient thoroughly to neutralize the acid. The effervescence being finished, strain the liquor through paper; and after proper evaporation, set it aside to crystallize.

The operator ought to take care that the vapour separated during the effervescence shall not be applied to his nostrils; as fixed air, when applied to the olfactory nerves, is highly deleterious to life.

This is an elegant and one of the least troublesome ways of preparing this salt. The Edinburgh college, in their former editions, ordered the acid liquor to be dropped into the alkali: by the converse procedure now received, it is obviously more easy to secure against a redundancy of acidity; and for the greater certainty in this point, it may be expedient, as in the foregoing process, to drop in a little more of the alkaline ley than the cessation of the effervescence seems to require.

In a former edition of the same pharmacopœia, the acid was directed to be diluted only with its equal weight of water, and the alkali with that quantity of water which it is capable of imbibing from the atmosphere. By that imperfection there was not water enough to keep the vitriolated tartar dissolved; on which account, as fast as the alkali was neutralized by the acid, a great part fell to the bottom in a powdery form. In order to obtain perfect and well formed crystals, the liquor should not be set in the cold, but continued in moderate heat, such as the hand can scarcely bear, that the water may slowly evaporate.

It is remarkable, that although the vitriolic acid and fixed alkaline salt do each readily unite with water, and strongly attract moisture, even from the air, yet the neutral resulting from the combination of these two, vitriolated tartar, is one of the salts most difficult of solution, very little of it being taken up by cold water.

Vitriolated tartar, in small doses, as a scruple or half a dram, is an useful aperient; in large ones, as four or five drams, a mild cathartic, which does not pass off so hastily as the bitter cathartic salt or salt of Glauber, and seems to extend its action further. The wholesale dealers in medicines have commonly substituted for it an article other life almost useless, in their shops, the residuum of Glauber's spirit of nitre. This may be looked on as a venial fraud, if the spirit has been prepared as formerly directed, and the residuum dissolved and crystallized: but it is a very dangerous one if the vitriolic acid has been used in an over proportion, and the caput mortuum employed without crystallization; the salt in this case, instead of a mild neutral one, of a moderately bitter taste, proving highly acid. The purchaser ought therefore to insist on, the salt being in

a crystalline form. The crystals when perfect are oblong, with six flat sides, and terminated at each end by a six sided pyramid: some appear composed of two pyramids joined together by the bases; and many, in the most perfect crystallizations we have seen, are very irregular. They decompitate in the fire, somewhat like those of sea-salt, for which they have sometimes been mistaken.

Salt of many virtues. E.

- 230 Take nitre in powder, flowers of sulphur, of each equal parts. Mix them well together, and inject the mixture by little and little at a time into a red-hot crucible: the deflagration being over, let the salt cool, after which it is to be put up in a glass vessel well shut. The salt may be purified by dissolving it in warm water, filtering the solution, and exhaling it to dryness, or by crystallization.

This is another method of uniting the vitriolic acid with the common vegetable fixed alkali. Both the nitre and the sulphur are decomposed in the operation: the acid of the nitre, and the inflammable principle of the sulphur, detonate together, and are dissipated; while the acid of the sulphur (which, as we have already seen, is no other than the vitriolic acid) remains combined with the alkaline basis of the nitre. The shops accordingly have substituted the foregoing preparation for the sulphurest.

Vitriolated natron. L.

- 231 Take of the salt which remains after the distillation of the muriatic acid, two pounds; distilled water, two pints and an half. Burn out the superfluous acid with a strong fire in an open vessel; then boil it for a little in the water: strain the solution, and set it by to crystallize.

Vitriolated soda, commonly called *cathartic salt of Glauber*. E.

- 232 Dissolve in warm water the mass which remains after the distillation of spirit of sea-salt: filter the solution, and crystallize the salt.

The directions given for the preparation of this salt, long known by the name of *sal mirabile Glauberi*, are nearly the same in the pharmacopœias of both colleges; but those of the London college are to be preferred, as being most accurate and explicit.

In a former edition of the Edinburgh pharmacopœia, it was ordered, that if the crystals (obtained as above) proved too sharp, they should be again dissolved in water, and the filtered liquor evaporated to such a pitch only as may dispose the salt to crystallize. But there is no great danger of the crystals proving too sharp, even when the spirit of salt is made with the largest proportion of oil of vitriol directed under that process. The liquor which remains after the crystallization is indeed very acid; and with regard to this preparation, it is convenient it should be so; for otherwise the crystals will be very small, and likewise in a small quantity. Where a sufficient proportion of oil of vitriol has not been employed in the distillation of the spirit, it is necessary to add some to the liquor, in order to promote the crystallization of the salt.

The title of *cathartic salt*, which this salt has often had, expresses its medical virtues. Taken from half

an ounce to an ounce, or more, it proves a mild and useful purgative; and in smaller doses, largely diluted, a serviceable aperient and diuretic. The shops frequently substitute for it the bitter cathartic salt, which is nearly of the same quality, but somewhat more unpleasant, and, as is said, less mild in operation. They are very easily distinguishable from each other, by the effect of alkaline salts upon solutions of them. The solutions of Glauber's salt suffer no visible change from this addition, its own basis being a true fixed alkali: but the solution of the bitter cathartic salt grows instantly white and turbid; its basis, which is an earth, being extricated copiously by the alkaline salt.

Purified nitre. I.

Take of nitre two pounds; distilled water, four pints.

Boil the nitre in the water till it be dissolved; strain the solution, and set it aside to crystallize.

Common nitre contains usually a considerable portion of sea-salt, which in this process is separated, the sea-salt remaining dissolved after the greatest part of the nitre has crystallized. The crystals which shoot after the first evaporation are large, regular, and pure: but when the remaining liquor is further evaporated, and this repeated a second or third time, the crystals prove at length small, imperfect, and tipped with little cubical crystals of sea-salt.

When rough nitre, in the state wherein it is first extracted from the earths impregnated with it, is treated in this manner, there remains at last a liquor, called *mother-ley*, which will no longer afford any crystals: This appears to participate of the nitrous and marine acids, and to contain an earthy matter dissolved by those acids. On adding alkaline lixivium, the earth is precipitated; and when thoroughly washed with water, proves insipid. If the liquor be evaporated to dryness, a bitterish saline matter is left; which being strongly calcined in a crucible, parts with the acids, and becomes, as in the other case, insipid.

This earth has been celebrated as an excellent purgative, in the dose of a dram or two; and, in smaller doses, as an alterant in hypochondriacal and other disorders. This medicine was for some time kept a great secret, under the name of *magnesia alba, nitrous panacea, Count Palma's powder, il polvere albo Romano, poudre de Sentinelli, &c.* till Lancisi made it public in his notes on the *Metallotroica Vaticana*. It has been supposed, that this earth is no other than a portion of the lime commonly added in the elixation of nitre at the European nitre-works: but though the specimens of magnesia examined by Neumann, and some of that which has lately been brought hither from abroad, gave plain marks of a calcareous nature; yet the true magnesia must be an earth of a different kind, calcareous earths being rather astringent than purgative. The earthy basis of the bitter cathartic salt is found to have the properties ascribed to the true magnesia of nitre, and appears to be the very same species of earth: from that salt therefore this medicine is now prepared, as will be seen hereafter. The magnesia alba differs from calcareous earths, in having a less powerful attraction for fixed air, and in not becoming caustic by calcination.

Acetated kali. I.

Take of kali one pound; boil it with a slow fire in four or five times its quantity of distilled vinegar; the effervescence ceasing, let there be added at different times more distilled vinegar, until the last vinegar being nearly evaporated, the addition of fresh will excite no effervescence, which will happen when about twenty pounds of distilled vinegar are consumed; afterwards let it be dried slowly. An impure salt will be left, which melt for a little while with a slow fire; then let it be dissolved in water, and filtered through paper. If the fusion has been rightly performed, the strained liquor will be colourless; if otherwise, of a brown colour. Lastly, evaporate this liquor with a slow fire, in a very shallow glass vessel; frequently stirring the mass, that the salt may be more completely dried, which should be kept in a vessel close stopped. The salt ought to be very white, and dissolve wholly, both in water and spirit of wine, without leaving any feces. If the salt, although white, should deposit any feces in spirit of wine, that solution in the spirit should be filtered through paper, and the salt again dried.

Acetated fixed vegetable alkali, commonly called regenerated tartar. E.

Take of salt of tartar one pound; boil it with a very gentle heat in four or five times its quantity of distilled vinegar; add more distilled vinegar at different times, till on the watery part of the former quantity being nearly dissipated by evaporation, the new addition of vinegar ceases to raise any effervescence. This happens when about twenty pounds by weight of distilled vinegar has been consumed. The impure salt remaining after the exsiccation, is to be liquefied with a gentle heat for a short time, and it is proper that it should only be for a short time; then dissolve it in water, and strain through paper. If the liquefaction has been properly performed, the strained liquor will be limpid; but if otherwise, of a brown colour. Evaporate this liquor with a very gentle heat in a shallow glass vessel, occasionally stirring the salt as it becomes dry, that its moisture may sooner be dissipated. Then put it up into a vessel very closely stopped, to prevent it from liquefying in the air.

This salt had formerly the name of *diuretic salt* in the London pharmacopœia; but that which they now employ, or perhaps in preference to it, the name of *potassa acetata*, gives a clearer idea of its nature.

The purification of this salt is not a little troublesome. The operator must be particularly careful, in melting it, not to use a great heat, or to keep it long liquefied: a little should be occasionally taken out, and put into water; and as soon as it begins to part freely with its black colour, the whole is to be removed from the fire. In the last drying, the heat must not be so great as to melt it: otherwise it will not prove totally soluble. In the elixation in spirit of wine, be exsiccated, and the mass must not be liquefied with a very gentle fire, it gives the last appearance which has procured it the name of *regenerated*.

In the fourth volume of the Memoirs of the correspondents of the French Academy, lately published, Mr Cadet has given a method of making the salt white at the first evaporation, without the trouble of any farther purification. He observes, that the brown colour depends on the oily matter of the vinegar being burnt by the heat commonly employed in the evaporation; and his improvement consists in diminishing the heat at the time that this burning is liable to happen. The process he recommends is as follows:

Dissolve a pound of salt of tartar in a sufficient quantity of cold water; filter the solution, and add by degrees as much distilled vinegar as will saturate it, or a little more. Set the liquor to evaporate in a stone-ware vessel in a gentle heat, not so strong as to make it boil. When a pellicle appears on the surface, the rest of the process must be finished in a water-bath. The liquor acquires by degrees an oily consistence, and a pretty deep brown colour; but the pellicle or scum on the top looks whitish, and when taken off and cooled, appears a congeries of little brilliant silver-like plates. The matter is to be kept continually stirring, till it be wholly changed into this white flaky matter; the complete drying of which is most conveniently effected in a warm oven.

We shall not take upon us to determine whether the pure or impure salt is preferable as a medicine; observing only, that the latter is more of a saponaceous nature, the former more acrid, though somewhat more agreeable to the stomach. Mr Cadet reckons the salt prepared in his method superior both to the brown and white sorts made in the common way, as possessing both the oily quality of the one and the agreeableness of the other, and as being always uniform or of the same power: whereas the others are liable to vary considerably, according to the degree of heat employed in the evaporation. They are all medicines of great efficacy, and may be so dosed and managed as to prove either mildly cathartic, or powerfully diuretic: few of the saline deobstruents come up to them in virtue. The dose is from half a scruple to a dram or two. A bare mixture, however, of alkaline salt and vinegar, without exsiccation, is not perhaps much inferior as a medicine to the more elaborate salt. Two drams of the alkali, saturated with vinegar, have been known to occasion ten or twelve stools in hydropic cases, and a plentiful discharge of urine, without any inconvenience.

Water of acetated ammonia. L.

- 236 Take of ammonia, by weight, two ounces; distilled vinegar, four pints; or as much as is sufficient to saturate the ammonia. Mix.

Spirit of Mindererus. E.

- 237 Take any quantity of the volatile alkaline salt of sal ammoniac, and gradually pour upon it distilled vinegar till the effervescence ceases; occasionally stirring the mixture to promote the action of the vinegar on the salt.

Though this article has long been known by the name of Spiritus Mindereri, so called from the inventor; yet that employed by the London college is undoubtedly preferable, as giving a proper idea of its constituent parts.

This is an excellent aperient saline liquor. Taken warm in bed, it proves commonly a powerful diaphoretic or sudorific; and as it operates without heat, it has place in febrile and inflammatory disorders, where medicines of the warm kind, if they fail of procuring sweat, aggravate the distemper. Its action may likewise be determined to the kidneys, by walking about in a cool air. The common dose is half an ounce, either by itself, or along with other medicines adapted to the intention. Its strength is not a little precarious, depending much on that of the vinegar; an inconvenience which cannot easily be obviated, for the saline matter is not reducible to the form of a concrete salt.

Tartarized kali. L.

- Take of kali one pound; crystals of tartar, three pounds; distilled water, boiling, one gallon. To the salt, dissolved in water, throw in gradually the crystals of tartar, powdered: filter the liquor, when cold, through paper: and, after due evaporation, set it apart to crystallize. 238

Tartarized vegetable fixed alkali, commonly called soluble tartar. E.

- Take of purified fixed vegetable alkaline salt one pound; water, 15 pounds. To the salt dissolved in the boiling water gradually add crystals of tartar in fine powder, as long as the addition thereof raises any effervescence, which almost ceases before three times the weight of the alkaline salt hath been injected; then strain the cooled liquor through paper, and after due evaporation set it aside to crystallize. 239

Common white tartar is perhaps preferable for this operation to the crystals usually met with. Its impurities can here be no objection; since it will be sufficiently depurated by the subsequent filtration.

The preparation of this medicine by either of the above methods is very easy; though some chemists have rendered it sufficiently troublesome, by a nicety which is not at all wanted. They insist upon hitting the very exact point of saturation between the alkaline salt and the acid of the tartar; and caution the operator to be extremely careful, when he comes near this mark, lest by imprudently adding too large a portion of either, he render the salt too acid or too alkaline. If the liquor be suffered to cool a little before it be committed to the filter, and then properly exhaled and crystallized, no error of this kind can happen, though the saturation should not be very exactly hit: for since crystals of tartar are very difficultly soluble even in boiling water, and when dissolved therein concrete again upon the liquor's growing cold, if any more of them has been employed than is taken up by the alkali, this superfluous quantity will be left upon the filter; and, on the other hand, when too much of the alkali has been used, it will remain uncrystallized. The crystallization of this salt indeed cannot be effected without a good deal of trouble: it is therefore most convenient to let the acid salt prevail at first; to separate the superfluous quantity, by suffering the liquor to cool a little before filtration; and then proceed to the total evaporation of the aqueous fluid, which will leave behind it the neutral salt required. The most proper vessel for this purpose is a stone-ware one; iron discolours the salt.

Soluble tartar, in doses of a scruple, half a dram, or a dram, is a mild cooling aperient: two or three drams commonly loosen the belly; and an ounce proves pretty strongly purgative. It has been particularly recommended as a purgative for maniacal and melancholic patients. Malouin says, it is equal in purgative virtue to the cathartic salt of Glauber. It is an useful addition to the purgatives of the resinous kind, as it promotes their operation, and at the same time tends to correct their griping quality. But it must never be joined in conjunction with any acid; for all acids decompose it, absorbing its alkaline salt, and precipitating the tartar. On this account it is improper to join it to tamarinds, or such like acid fruits; which is too often done in the extemporaneous practice of those physicians who are fond of mixing different cathartics together.

Tartarized natron. L.

Take of natron, 20 ounces; crystals of tartar, powdered, 2 pounds; distilled water, boiling, 10 pints. Dissolve the natron in the water, and gradually add the crystals of tartar: filter the liquor through paper; evaporate, and set it aside to crystallize.

Tartarized soda, commonly called Rochel salt. E.

The Rochel salt may be prepared from purified fossil alkaline salt and crystals of tartar, in the same manner as directed for the soluble tartar.

This is a species of soluble tartar, made with the salt of kali or soda, which is the same with the mineral alkali, or basis of sea-salt. It crystallizes far more easily than the preceding preparation, and does not, like it, grow moist in the air. It is also considerably less purgative, but is equally decomposed by acids. It appears to be a very elegant salt, and begins now to come into esteem in this country, as it has long been in France.

Purification of alum. L.

Take of alum, one pound; chalk, one dram by weight; distilled water, one pint. Boil them a little, strain, and set the liquor aside to crystallize.

We have already offered some observations on alum (see ALUM); and in general we may say that it comes from the alum works in England in a state of such purity as to be fit for every purpose in medicine: accordingly we do not observe that the purification of alum has a place in any other pharmacopœias; but by the present process it will be freed, not only from different impurities, but also from superabundant acid.

Burnt alum. L. E.

Take of alum, half a pound. Burn it in an earthen vessel so long as it bubbles.

This, with strict propriety, ought rather perhaps to be called dried alum than burnt alum; for the only effect of the burning here directed is to expel the water. In this state it is so acrid as to be frequently employed as an escharotic; and it is with this intention chiefly that it has a place in our pharmacopœias: but it has sometimes also been taken internally, particularly in cases of cholera.

Salt or sugar of milk. Succ.

Take of the whey of milk, prepared by runct, any

quantity: let it be boiled over a moderate fire to the consistence of a syrup; then put it in a cold place, that crystals may be formed. Let the fluid which remains be again managed in the same manner, and let the crystals formed be washed with cold water.

It has been by some imagined, that the superiority of one milk over another depends on its containing a larger proportion of this saline or saccharine part; and particularly, that upon this the reputed virtues of ass milk depend. Hence this preparation has been greatly celebrated in disorders of the breast, but it is far from answering what has been expected from it. It has little sweetness, and is difficult of solution in water. A saline substance, much better deserving the name of sugar, may be obtained by evaporating new milk, particularly that of the ass, to dryness, digesting the dry matter in water till the water has extracted its soluble parts, and then inspissating the filtered liquor. This preparation is of great sweetness, though neither white nor crystalline; nor is it perhaps in the pure crystallizable parts of milk that its medicinal virtues reside; and so little reliance is put on it as a medicine, that it has no place in the London or Edinburgh pharmacopœias; although it long has stood, and still stands, in the foreign ones.

Salt of sorrel. Succ.

Take any quantity of the expressed juice of the leaves of wood sorrel; let it boil gently, that the feculent matter may be separated; then strain it till it be clear, and after this boil it on a moderate fire to the consistence of a syrup. Put it into long necked glass vessels, and place it in a cold situation that it may crystallize. Let these crystals be dissolved in water, and again formed into purer ones.

To make the sorrel yield its juice readily, it should be cut to pieces, and well bruised in a small mortar, before it be committed to the press. The magma which remains in the bag still retaining no inconsiderable quantity of saline matter, may be advantageously boiled in water, and the decoction added to the expressed juice. The whole may be afterwards degenerated together, either by the method above directed, or by running the liquor several times through a linen cloth. In some cases the addition of a considerable portion of water is necessary, that the juice, thus diluted, may part the more freely with its feculencies; on the separation of which the success of the process much depends.

The evaporation should be performed either in shallow glass basins, or in such earthen ones as are of a compact close texture; such are those usually called *stone-ware*. The common earthen vessels are subject to have their glazing corroded, and are so extremely porous, as readily to imbibe and retain a good quantity of the liquor; metallic vessels are particularly apt to be corroded by these acid kinds of juices.

These juices are so viscid, and abound so much with heterogeneous matter, of a quite different nature from any thing saline, that a pellicle, or pure saline insolution upon the surface, is in vain expected. Boerhaave, therefore, and the more expert writers in pharmaceutical chemistry, with great judgment direct the evaporation of the superfluous moisture to be continued

until the matter has acquired the consistence of cream. If it be now suffered to stand for an hour or two in a warm place, it will, notwithstanding the former depurations, deposit a fresh sediment, from which it should be warily decanted before it be put into the vessel in which it is designed to be crystallized.

Some recommend an unglazed earthen vessel as preferable for this purpose to a glass one; the smoothness of the latter being supposed to hinder the salt from sticking thereto; while the juice easily insinuating itself into the pores of the former, has a great advantage of shooting its saline spicula to the sides. Others slightly incrustate the sides and bottom of whatever vessel they employ with a certain mineral salt, which greatly disposes the juice to crystallize, to which of itself it is very averse; but this addition is, with regard to its medical virtue, quite different from the salt here intended.

The liquor which remains after the crystallization may be depurated by a gentle colature, and after due inspissation set to shoot again; when a farther produce of crystals will be obtained.

The process for obtaining this salt is very tedious; and the quantity of salt which the juices afford is extremely small: hence they are hardly ever made or expected in the shops. They may be somewhat sooner separated from the mucilage and other seculencies, by clarification with whites of eggs, and by adding very pure white clay.

In the manner above described, salts may also be obtained from other acid, austere, and bitterish plants, which contain but a small quantity of oil.

The virtues of the essential salts have not been sufficiently determined from experience. This much, however, is certain, that they do not, as has been supposed, possess the virtues of the subjects entire, excepting only the acids and sweets. The others seem to be almost all of them nearly similar, whatever plant they were obtained from. In watery extracts of wormwood, carduus, camomile, and many other vegetables, kept for some time in a soft state, there may be observed fine saline efflorescences on the surface, which have all nearly the same taste, somewhat of the nitrous kind. They are supposed by some to be in reality no more than an impure species of volatile nitre (that is, a salt composed of the nitrous acid and volatile alkali): those which were examined by the chemists of the French academy desagrated in the fire, and being triturated with fixed alkali, exhaled an urinous odour; plain marks of their containing those two ingredients.

Acid salt of borax. Succ.

246 Take of borax, an ounce and a half; warm spring-water, one pound. Mix them in a glass vessel, that the borax may be dissolved; then pour into it three drams of the concentrated acid of vitriol: evaporate the liquor till a pellicle appears upon it; after this let it remain at rest till the crystals be formed. Let them be washed with cold water, and kept for use.

This salt, which has long been known by the title of the *sedative salt of Homberg*, is not unfrequently formed by sublimation: but the process by crystallization here directed is less troublesome, though the salt proves generally less white, and is apt likewise to retain a

part of Glauber's salt, especially if the evaporation be long protracted.

The salt of borax to the taste appears to be a neutral; but when it is examined by alkalis, it shows the properties of an acid, effervescing, uniting, and crystallizing with them, and it destroys their alkaline quality. It dissolves both in water and spirit of wine, although not very readily in either.

The virtues attributed to it may in some degree be inferred from the name of *sedative*, by which it was long distinguished. It has been supposed to be a mild anodyne, to diminish febrile heat, to prevent or remove delirium, and to allay, at least for some time, spasmodical affections, particularly those which are the attendants of hypochondriasis and hysteria. It may be given in doses from two to twenty grains.

Purified sal ammoniac. Succ.

Dissolve sal ammoniac in spring-water; strain the liquor through paper; evaporate it to dryness in a glass vessel by means of a moderate fire.

The sal ammoniac imported from the Mediterranean often contains such impurities as to render the above process necessary; but that which is prepared in Britain from foot and sea-salt, is in general brought to market in a state of very great purity. Hence this process is now altogether omitted both in the London and Edinburgh pharmacopœias. It furnishes, however, when necessary, an easy and effectual mode of obtaining a pure ammonia muriata.

CHAP. VIII. *Magnesia.*

White magnesia.

Take of bitter purging salt, kali, each two pounds; distilled water, boiling, 20 pints. Dissolve the bitter salt and the kali separately in 10 pints of water, and filter through paper; then mix them. Boil the liquor a little while, and strain it while hot through linen, upon which will remain the white magnesia; then wash away, by repeated affusions of distilled water, the vitriolated kali. *L.*

Take of bitter purging salt, purified fixed vegetable alkali, equal weights. Dissolve them separately in double their quantity of warm water, and let the liquor be strained or otherwise freed from the feces; then mix them, and instantly add eight times their quantity of warm water. Let the liquor boil a little, stirring it very well at the same time; then let it rest till the heat be somewhat diminished; after which strain it through a cloth: the magnesia will remain upon the cloth, and it is to be washed with pure water till it be altogether void of saline taste. *E.*

The processes here directed by the London and Edinburgh colleges are nearly the same; but the former seem to have improved somewhat on the latter, both in simplifying the process, and in the employment of distilled water.

The *bitter cathartic salt*, or *Epsom salt*, is a combination of the vitriolic acid and magnesia. In this process, then, a double elective attraction takes place: the vitriolic

vitriolic acid forsakes the magnesia, and joins the mild alkali, for which it has a greater attraction; while the magnesia in its turn unites with the fixed air discharged from the mild alkali, and ready to be absorbed by any substance with which it can combine.

We have therefore two new products, viz. a vitriolated tartar, and magnesia united with fixed air. The former is dissolved in the water, and may be preserved for use; the latter, as being much less soluble, sinks to the bottom of the vessel. The intention of employing such a large quantity of water and of the boiling is, that the vitriolated tartar may be all thoroughly dissolved; this salt being so scarcely soluble in water, that without this expedient a part of it might be precipitated along with the magnesia. It might perhaps be more convenient to employ the mineral alkali; which forming a Glauber's salt with the vitriolic acid, would require less water for its suspension. By the after ablutions, however, the magnesia is sufficiently freed from any portion of vitriolated tartar which may have adhered to it.

The ablutions should be made with very pure water; for nicer purposes distilled water may be used with advantage; and soft water is in every case necessary. Hard water for this process is peculiarly inadmissible, as the principle in waters giving the property called *hardness* is generally owing to an imperfect nitrous selenite, whose base is capable of being disengaged by magnesia united with fixed air. For though the attraction of magnesia itself to the nitrous acid is not greater than that of calcareous earths; yet when combined with fixed air, a peculiar circumstance intervenes; whence it is deducible, that the sum of the forces tending to join the calcareous earth with the air of the magnesia, and the magnesia with the acid, is greater than the sum of the forces tending to join the calcareous earth with the acid, and the magnesia with the fixed air.

This phenomenon must therefore depend on the presence of fixed air, and its greater attraction for lime than for magnesia. On this account, if hard water be used, a quantity of calcareous earth must infallibly be deposited on the magnesia; while the nitrous acid with which it was combined in the water, will in its turn attach itself to a portion of the magnesia, forming what may be called a *nitrous magnesia*.

All the alkalis, and also calcareous earths, have a greater attraction for fixed air than magnesia has: Hence, if this last be precipitated from its solution in acids by caustic alkali, it is then procured free from fixed air; but for this purpose calcination is more generally employed in the manner described in the process which next follows. Magnesia is scarcely at all soluble in water: the infinitely small portion which this fluid is capable of taking up, is owing to the fixed air of the magnesia; and it has been lately discovered, that water impregnated with this acid is capable of dissolving a considerable portion: for this purpose it is necessary to employ magnesia already saturated with fixed air, as magnesia deprived of this air would quickly abstract it from the water, whereby the force of the latter would be very considerably diminished. Such a solution of magnesia might be useful for several purposes in medicine.

Magnesia is the same species of earth with that obtained from the mother-ley of nitre, which was for several years a celebrated secret in the hands of some particular persons abroad. Hoffman, who describes the preparations of the nitrous magnesia, gives it the character of an useful antacid, a safe and inoffensive laxative in doses of a dram or two, and a diaphoretic and diuretic when given in smaller doses of 15 or 20 grains. Since his time, it has had a considerable place in the practice of foreign physicians; and is now in great esteem among us, particularly in heart burns, and for preventing or removing the many disorders which children are so frequently thrown into from a redundancy of acid humours in the first passages: it is preferred, on account of its laxative quality, to the common absorbents, which, unless gentle purgatives be occasionally given to carry them off, are apt to lodge in the body, and occasion a costiveness very detrimental to infants.

Magnesia alba, when prepared in perfection, is a white and very subtle earth, perfectly void of smell or taste, of the class of those which dissolve in acids. It dissolves freely even in the vitriolic acid; which, in the common way of making solutions, takes up only an inconsiderable portion of other earths. Combined with this acid, it forms the bitter purging or Epsom salt, very easily soluble in water; while the common absorbents form with the same acid almost insipid concretes, very difficult of solution. Solutions of magnesia in all acids are bitter and purgative, while those of the other earths are more or less austere and astringent. A large dose of magnesia, if the stomach contain no acid to dissolve it, does not purge or produce any sensible effect; a moderate one, if an acid be lodged there, or if acid liquors be taken after it, procures several stools; whereas the common absorbents, in the same circumstances, instead of loosening, bind the belly. It is obvious, therefore, that magnesia is specifically different from the other earths, and that it is applicable to several useful purposes in medicine.

Magnesia was formerly made with the mother-water of nitre evaporated to dryness, or precipitated by a fixed alkali. It has gone under different names, as the *white powder of the Count of Palma*, *powder of seninelle*, *polychrest*, *laxative powder*, &c. It seems to have got the character *white*, to distinguish it from the dark-coloured mineral called also *magnesia* or *manganese*; a substance possessing very different properties. We have not heard that pure native magnesia has been found in its uncombined state. A combination of it with sulphur has been discovered to cover a stratum of coal at Littry in Lower Normandy. It has also been found in certain serpentine earths in Saxony, and in marly and alum earths.

Calcined magnesia.

Take of white magnesia, four ounces. Expose it to a strong heat for two hours; and, when cold, let it by. Keep it in a vessel closely stopped. *L.*
Let magnesia, put into a crucible, be continued in a red heat for two hours; then put it up in close glass vessels. *E.*

By this process the magnesia is freed of fixed air; which, according to Dr Black's experiments, consti-

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tutes about $\frac{1}{4}$ ths of its weight. A kind of opaque foggy vapour is observed to escape during the calcination, which is nothing else than a quantity of fine particles of magnesia buoyed off along with a stream of the disengaged air. About the end of the operation, the magnesia exhibits a kind of luminous or phosphorescent property; and this may be considered as a pretty exact criterion of its being deprived of air.

Calced magnesia is equally mild as when saturated with fixed air; and this circumstance is sufficient to establish a difference between it and calcareous earths, all of which are converted by calcination into a caustic quicklime.

The calcined magnesia is used for the same general purposes as the magnesia combined with fixed air. In certain affections of the stomach, accompanied with much flatulence, the calcined magnesia is found preferable, not only as containing more of the real earth of magnesia in a given quantity, but as being also deprived of its air. It neutralizes the acid of the stomach without that extrication of air which is often a troublesome consequence in employing the aerated magnesia in these complaints. It is proper to observe, that magnesia, whether combined with or deprived of fixed air, is similar to the mild calcareous earths in promoting and increasing putrefaction. The same has even been observed with respect to the Epsom and some other salts which have this earth for their base.

CHAP. IX. Preparations of Sulphur.

Washed flowers of sulphur. L.

250 Take of flowers of sulphur, one pound; distilled water, four pints. Boil the flowers of sulphur a little while in the distilled water; then pour off this water, and wash off the acid with cold water; lastly, dry the flowers.

In the former editions of our pharmacopœias directions were given for the preparation of the flowers of sulphur themselves; but as a large apparatus is necessary for doing it with any advantage, it is now scarcely ever attempted by the apothecaries. When the flowers are properly prepared, no change is made on the qualities of the sulphur. Its impurities only are separated; and at the same time it is reduced to a finer powder than it can easily be brought to by any other means. But as the flowers of sulphur are generally sublimed in very capacious rooms, which contain a large quantity of air, or in vessels not perfectly close, some of those that arise at first are apt to take fire, and thus are changed into a volatile acid vapour, which mingling with the flowers that sublime afterwards, communicates to them a considerable degree of acidity. In this case the ablution here directed is for the general use of the medicine absolutely necessary; for the flowers thus tainted with acid sometimes occasion gripes, and may in other respects be productive of effects different from those of pure sulphur. There are, however, some particular combinations to which they are supposed to be better adapted when unwashed, such as their union with mercury into æthiops mineral; and accordingly for that preparation the unwashed flowers are directed by the London college.

Sulphurated kali. L.

Take of flowers of sulphur, one ounce; kali, five ounces. Mix the salt with the melted sulphur, by frequently stirring, until they unite into an uniform mass. 251

This preparation, in the former editions of our pharmacopœias, had the name of *hepar sulphuris*, or *liver of sulphur*.

It is much more convenient to melt the sulphur first by itself, and add the salt of tartar by degrees, as here directed, than to grind them together, and afterwards endeavour to melt them, as ordered in former editions: for in this last case the mixture will not flow sufficiently thin to be properly united by stirring; and the sulphur either takes fire or sublimes in flowers, which probably has been the reason why so large a proportion of it has been commonly directed. Even in the present method a considerable part of the sulphur will be dissipated; and if it were not, the *hepar* would not be of its due quality: for one part of sulphur requires two of the alkaline salt to render it perfectly soluble in water, which this preparation ought to be.

The *hepar sulphuris* has a fetid smell and a nauseous taste. Solutions of it in water, made with sugar into a syrup, have been recommended in coughs and other disorders of the breast. Our pharmacopœias, nevertheless, have deservedly rejected this syrup, as common practice has almost done the balsams. Solutions of the *hepar* in water have been also recommended in herpetic and other cutaneous affections. Some physicians have even employed this solution, in a large quantity, as a bath for the cure of psora; and in cases of tinea capitis it has often been used by way of lotion.

The *hepar*, digested in rectified spirit of wine, imparts a rich gold colour, a warm, somewhat aromatic taste, and a peculiar, not ungrateful smell. A tincture of this kind is kept in the shops under the name of another mineral. The *hepar sulphuris* has been by some strongly recommended to prevent the effects of mineral poison.

Sulphurated oil and sulphurated petroleum. L.

Take of flowers of sulphur, four ounces; olive oil, sixteen ounces. Boil the flowers of brimstone with the oil, in a pot slightly covered, until they be united. In the same manner is made *sulphurated petroleum*. 252

These articles are analogous to what had formerly a place in our pharmacopœias under the titles of *balsamum sulphuris simplex, crassum, et Barbadesense*. And, besides these, a place was also given to the *balsamum sulphuris anisatum, terbinthinatum*, &c. While these articles, however, are now banished from our pharmacopœias, even those retained are less in use than formerly.

These preparations are more conveniently and safely made in a tall glass body, with the mouth at least an inch in diameter, than in the circulatory or close vessels in which they have commonly been directed to be prepared: for when the sulphur and oil begin to act vehemently upon each other, they not only rarify into a large volume, but likewise throw out impetuously great quantities of an elastic vapour; which, if the vessels be closed, or the orifices not sufficient to allow it

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it a free exit, will infallibly burst them. Hoffman relates a very remarkable history of the effects of an accident of this kind. In the vessel above recommended the process may be completed, without danger, in four or five hours, by duly managing the fire, which should be very gentle for some time, and afterwards increased so as to make the oil just bubble or boil; in which state it should be kept till all the sulphur appears to be taken up.

Essential oils, employed as menstrua for sulphur, undergo a great alteration from the degree of heat necessary for enabling them to dissolve the sulphur; and hence the balsams have not near so much of their flavour as might be expected. It should therefore seem more eligible to add a proper quantity of the essential oils to the simple balsam: these readily incorporate by a gentle warmth, if the vessel be now and then shaken. We may thus compose a balsam more elegant than those made in the manner formerly recommended, and which retains so much of the flavour of the oil as is in some measure sufficient to cover the taste of the sulphur, and render it supportable.

The balsams of sulphur have been strongly recommended in coughs, consumptions, and other disorders of the breast and lungs; but the reputation which they have had in these cases does not appear to have been built on any fair trial or experience of their virtues. They are manifestly hot, acrimonious, and irritating; and therefore should be used with the utmost caution. They have frequently been found to injure the appetite, offend the stomach and viscera, parch the body, and occasion thirst and febrile heats. The dose of the simple balsam is from ten to forty drops: those with essential oils are not given in above half these quantities. Externally, they are employed for cleansing and healing foul running ulcers. Boerhaave conjectures that their use in these cases gave occasion to the virtues ascribed to them when taken internally.

Precipitated sulphur. L.

253 Take of sulphurated kali. six ounces; distilled water, one pound and a half; vitriolic acid, diluted, as much as is sufficient. Boil the sulphurated kali in the distilled water until it be dissolved. Filter the liquor through paper, to which add the vitriolic acid. Wash the precipitated powder by often pouring on water till it becomes insipid.

This preparation is not so white as that of the last pharmacopœia, which was made with quicklime; and which in some pharmacopœias had the name of *milk of sulphur*.

Pure milk of sulphur is not different in quality from pure sulphur itself; to which it is preferred in unguents, &c. only on account of its colour. The whiteness does not proceed from the sulphur having lost any of its parts in the operation, or from any new matter superadded: for if common sulphur be ground with alkaline salts, and set to sublime, it rises of a white like colour, the whole quantity of the alkali remaining unchanged; and if the milk be melted with a gentle fire, it returns into yellow sulphur again.

It may be observed, that the name *lac sulphuris*, or *milk of sulphur*, applied among us to the precipitate, is by the French writers confined to the white liquor before the precipitate has fallen from it.

CHAP. X. *Preparations of Antimony.*

ANTIMONY is composed of a metal, united with sulphur or common brimstone.

If powdered antimony be exposed to a gentle fire, the sulphur exhales; the metallic part remaining in form of a white calx, reducible, by proper fluxes, into a whitish brittle metal, called *regulus*. This is readily distinguished from the other bodies of that class, by its not being soluble in aquafortis; its proper menstruum is aqua-regia.

If aqua-regia be poured on crude antimony, the metallic part will be dissolved; and the sulphur thrown out, partly to the sides of the vessel, and partly to the surface of the liquor, in the form of a greyish yellow substance. This, separated and purified by sublimation, appears on all trials the same with pure common brimstone.

The metal freed from the sulphur naturally blended with it, and afterwards fused with common brimstone, resumes the appearance and qualities of crude antimony.

The antimonial metal is a medicine of the greatest power of any known substance; a quantity too minute to be sensible in the tenderest balance, is capable of producing violent effects, if taken dissolved, or in a soluble state. If given in such a form as to be immediately miscible with the animal fluids, it proves violently emetic; if so managed as to be more slowly acted on, cathartic; and in either case, if the dose be extremely small, diaphoretic. Thus, though vegetable acids extract so little from this metal, that the remainder seems to have lost nothing of its weight, the tinctures prove in large doses strongly emetic, and in smaller ones powerfully diaphoretic. The regulus has been cast into the form of pills, which acted as violent cathartics, though without suffering any sensible diminution of weight in their passage through the body; and this repeatedly for a great number of times.

This metal, divested of the inflammable principle which it has in common with other metallic bodies that are reducible to a calx, becomes indissoluble and inactive. The calx, nevertheless, urged with a strong fire, melts into a glass, which is as easy of solution, and as violent in operation, as the regulus itself: the glass, thoroughly mixed with such substances as prevent its solubility, as wax, resin, and the like, is again rendered mild.

VEGETABLE acids, as has already been observed, dissolve but an extremely minute portion of this metal: the solution nevertheless is powerfully emetic and cathartic. The nitrous and vitriolic acids only corrode it into a powder, to which they adhere so slightly as to be separable in a considerable degree by water, and totally by fire, leaving the regulus in form of a calx similar to that prepared by fire alone. The marine acid has a very different effect: this reduces the regulus into a violent corrosive; and though it difficultly unites, yet it adheres so very closely as not to be separable by any ablution, nor by fire, the regulus arising along with it. The nitrous or vitriolic acids expel the marine, and thus reduce the corrosive into a calx similar to the foregoing.

Sulphur remarkably abates the power of this metal: and hence crude antimony, in which the regulus

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hus appears to be combined with sulphur, from one-fourth to one-half its weight, proves altogether mild. If a part of the sulphur be taken away by such operations as do not destroy or calcine the metal, the remaining mass becomes proportionally more active.

The sulphur of antimony may be expelled by deslagration with nitre: the larger the quantity of nitre, to a certain point, the more of the sulphur will be dissipated, and the preparation will be the more active. If the quantity of nitre be more than sufficient to consume the sulphur, the rest of it, deslagrating with the inflammable principle of the regulus itself, renders it again mild.

The sulphur of antimony is likewise absorbed in fusion by certain metals and by alkaline salts. These last, when united with sulphur, prove a menstruum for all the metals (zinc excepted); and hence, if the fusion be long continued, the regulus is taken up, and rendered soluble in water.

From these particulars with respect to antimony, it may naturally be concluded, that it not only furnishes us with an useful and active medicine, but that it may also be exhibited for medical purposes under a great variety of different forms, and that the effects of these will be considerably diversified. And this has in reality been the case. For further information respecting antimony, and its uses in medicine, we refer our readers to the articles ANTIMONY; MATERIA MEDICA, p. 653, &c.; and CHEMISTRY *Index*. But although there is perhaps no preparation there mentioned, which is not fitted to serve some useful purpose; yet the colleges both of London and Edinburgh have now restricted the number of preparations in their pharmacopœias to a few only. And it is highly probable, that from the proper employment of them, every useful purpose to be answered by antimony may be accomplished.

Calcined antimony. L.

- 255 Take of antimony, powdered, eight ounces; nitre, powdered, two pounds. Mix them, and cast the mixture by degrees into a red hot crucible. Burn the white matter about half an hour; and, when cold, powder it; after which wash it with distilled water.

In the last edition of the London pharmacopœia this preparation had the name of *calx of antimony*; and it may be considered as at least very nearly approaching to some other antimonials of the old pharmacopœias, particularly to the nitrated diaphoretic antimony, washed ditto, and sibiatiated nitre; none of which are now received as separate formulas of our pharmacopœia, and indeed even the calx of antimony itself, at least as thus prepared, has not no place in the Edinburgh pharmacopœia.

The calx of antimony, when freed by washing from the saline matter, is extremely mild, if not altogether inactive. Hoffman, Lemery, and others, assure us, that they have never experienced from it any such effects as its usual title imports: Boerhaave declares, that it is a mere metallic earth, entirely destitute of all medicinal virtue: and the committee of the London college admit that it has no sensible operation. The common dose is from five grains to a scruple, or half a dram; though Willon relates, that he has

known it given by half ounces, and repeated two or three times a day, for several days together.

Some report that this calx, by keeping for a length of time, contracts an emetic quality: From whence it has been concluded, that the powers of the reguline part are not entirely destroyed; that the preparation has the virtues of other antimonials which are given as alteratives; that is, in such small doses as not to stimulate the primæ viæ; and that therefore diaphoretic antimony, or calcined antimony, as it is now more properly styled, is certainly among the mildest preparations of that mineral, and may be used for children, and similar delicate constitutions where the stomach and intestines are easily affected. The observations, however, from which these conclusions are drawn, does not appear to be well founded: Ludovici relates, that after keeping the powder for four years, it proved as mild as at first: and the Strasburgh pharmacopœia, with good reason, suspects, that where the calx has proved emetic, it had either been given in such cases as would of themselves have been attended with this symptom (for the great alexipharmac virtues attributed to it have occasioned it to be exhibited even in the more dangerous malignant fevers, and other disorders which are frequently accompanied with vomiting); or that it had not been sufficiently calcined, or perfectly freed from such part of the regulus as might remain uncalcined. The uncalcined part being grosser than the true calx, the separation is effected by often washing with water, in the same manner as directed for separating earthy powders from their grosser parts.

It has been observed, that when diaphoretic antimony is prepared with nitre abounding with sea-salt, of which all the common nitre contains some portion, the medicine has proved violently emetic. This effect is not owing to any particular quality of the sea-salt, but to its quantity, by which the proportion of the nitre to the antimony is rendered less.

The *nitrum sibiatiatum*, as it was called, is produced by the deslagration of the sulphur of the antimony with the nitre, in the same manner as the *sal polychrest*, from which it differs no otherwise than in retaining some portion of the antimonial calx.

Notwithstanding the doubts entertained by some respecting the activity of the antimonium calciatum, yet the London college have in our opinion done right in retaining it. For while it is on all hands allowed that it is the mildest of our antimonials, there are some accurate observers who consider it as by no means inefficacious. Thus Dr Healde tells us, that he has been in the habit of employing it for upwards of 40 years, and is much deceived, if, when genuine, it be not productive of good effects.

Nitrated calx of antimony. E.

- Take of antimony calcined for making the glass of antimony, and nitre, equal weights. Having mixed, and put them into a crucible, let them be heated, so that the matter shall be of a red colour for an hour; then let it be taken out of the crucible, and, after heating it, wash it repeatedly with warm water till it be insipid.

Although this preparation agrees nearly in name with the

the preceding, and has been considered as being nearly a complete calx of antimony, yet there can be no doubt that it is a medicine of a much more active nature than the former; and in place of being one of the mildest of the antimonials, it often operates with great violence when given in doses of a few grains only.

But as the effects of every preparation of antimony, not already conjoined with an acid, must depend on the quantity and condition of the acid in the stomach, so the ablution of the base of the nitre in this process gives full power to the acid of the stomach to act as far as possible on the calx; whereas, when the unwashed calx is employed, a great quantity of the acid in the stomach is neutralized by the alkaline base of the nitre adhering to the calx. The nitrated calx of antimony is supposed to be nearly the same with the article which has been so much celebrated, and has had such an extensive sale under the title of *Dr James's fever powder*. And it was as an article which might be employed in the place of James's powder, that the Edinburgh college introduced this into their pharmacopœia. There is, however, reason to believe, that the preparation of James's powder is somewhat different from that here directed; but their effects, as far as our observation goes, appear to be very nearly the same.

The nitrated calx of antimony has been thought by some preferable to emetic tartar, where the permanent effects of a long-continued nausea are required, and where we wish our antimonials to pass the pylorus and produce purging. But, like every other preparation where the reguline part is only rendered active by the acid in the stomach, the nitrated calx of antimony is in all cases of uncertain operation: sometimes proving perfectly inert, and at other times very violent in its effects. The dose is generally 10 or 12 grains, and this is often given all at once; an inconvenience not attending the emetic tartar; the quantity and effects of which we can generally measure with surprising minuteness.

There is, however, reason to believe, that by means of James's powder, and the nitrated calx, an artificial termination of fever is sometimes accomplished, and that too more frequently than by emetic tartar. This perhaps may sometimes be the consequence of the violence with which they operate. At the same time it must be admitted, that even the most violent operation by no means ensures an immediate recovery, but that on the contrary it is sometimes manifestly attended with bad effects.

Crocus of antimony.

Take of antimony, powdered; nitre, powdered, of each one pound; sea-salt, one ounce. Mix, and put them by degrees into a red-hot crucible, and melt them with an augmented heat. Pour out the melted matter; and, when cold, separate it from the scoræ. *L.*

Equal parts of antimony and nitre are to be injected by degrees into a red-hot crucible; when the detonation is over, separate the reddish metallic matter from the whitish crust; beat it into a powder, and edulcorate it by repeated washings with hot water, till the water comes off insipid. *E.*

Here the antimonial sulphur is almost totally consumed, and the metallic part left divested of its corrector. These preparations, given from two to six grains, generally act as violent emetics, greatly disordering the constitution. But the operation, like that of every preparation of antimony whose reguline part is not joined with an acid, must be liable to variations, according to the quantity and condition of the acid in the stomach. Their principal use is in maniacal cases, as the basis of some other preparations; and among the farriers, who frequently give to horses an ounce or two a day, divided into different doses as an alterative: in these, and other quadrupeds, this medicine acts chiefly as a diaphoretic.

The chemists have been accustomed to make the crocus with a less proportion of nitre than what is directed above; and without any farther melting than what ensues from the heat which the matter acquires by deflagration, which, when the quantity is large, is very considerable: a little common salt is added to promote the fusion. The mixture is put by degrees into an iron pot or mortar, somewhat heated, and placed under a chimney: when the first ladleful is in, a piece of lighted charcoal is thrown to it, which sets the matter on fire; the rest of the mixture is then added by little and little; the deflagration is soon over, and the whole appears in perfect fusion: when cold, a considerable quantity of scoræ is found on the surface; which scoræ are easily knocked off with a hammer. The crocus prepared after this manner is of a redder colour than that of the former editions of the London pharmacopœia. And indeed the method now directed by the London college may be considered as founded on this: It differs principally from that of the Edinburgh college in the employment of the sea-salt, by which the process is much facilitated.

Muriated antimony. L.

Take of the crocus of antimony, powdered; vitriolic acid, each one pound; dry sea-salt, two pounds. Pour the vitriolic acid into a retort, adding by degrees the sea-salt and crocus of antimony, previously mixed; then distil in a sand-bath. Let the distilled matter be exposed to the air several days, and then let the fluid part be poured off from the dregs.

Butter of antimony. E.

Take of crude antimony, one part; corrosive sublimate of mercury, two parts. Grind them first separately; then thoroughly mix them together, taking the utmost care to avoid the vapours. Put the mixture into a coated glass retort (having a short wide neck), so as to fill one half of it: the retort being placed in a sand-furnace, and a receiver adapted to it, give first a gentle heat, that only a dewy vapour may arise: the fire being then increased, an oily liquor will ascend and congeal in the neck of the retort, appearing like ice, which is to be melted down by a live coal cautiously applied. This oily matter is to be rectified in a glass retort into a pellucid liquor.

The process here directed by the Edinburgh college, and which is nearly the same with what stood in

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the former edition of the London pharmacopœia, is extremely dangerous, inasmuch that even the life of the operator, though tolerably versed in common pharmacy, may be much endangered for want of due care. Boerhaave relates, that one, who from the title he gives him is not to be supposed inexpert in chemical operations, or unacquainted with the danger attending this, was suffocated for want of proper care to prevent the bursting of the retort. The fumes which arise, even upon mixing the antimony with the sublimate, are highly noxious, and sometimes issue so copiously and suddenly, as very difficultly to be avoided. The utmost circumspection therefore is necessary.

The caustic, or butter as it is called, appears to be a solution of the metallic part of the antimony in the marine acid of the sublimate: the sulphur of the antimony, and the mercury of the sublimate, remain at the bottom of the retort united into an æthiops. This solution does not succeed with spirit of salt in its liquid state, and cannot be effected, unless (as in the case of making sublimate) either the acid be highly concentrated, and both the ingredients strongly heated; or when the antimony is exposed to the vapours of the acid distilled from the black calx of manganese. By this last process a perfect solution of the regulus of antimony in the muriatic acid is effected. Of this more simple, more safe, and less expensive method of preparing muriated antimony, an account is given by Mr Ruffel in the Transactions of the Royal Society of Edinburgh.

If regulus of antimony were added in the distillation of spirit of sea-salt without water, a solution would also be made.

The method, however, now directed by the London college, in which vitriolic acid and sea-salt are employed to give a double elective attraction, is perhaps to be considered as preferable to any of the others. In this they have followed very nearly the directions given in the Pharmacopœia Suecica, which are taken from the process of Mr Scheele.

When the congealed matter that arises into the neck of the retort is liquified by the moisture of the air, it proves less corrosive than when melted down and rectified by heat; though it seems, in either case, to be sufficiently strong for the purposes of consuming fungous flesh and the callous lips of ulcers. It is remarkable, that though this saline concrete readily and almost entirely dissolves by the humidity of the air, only a small quantity of white powder separating, it nevertheless will not dissolve on putting water to it directly: even when previously liquefied by the air, the addition of water will precipitate the solution. And accordingly, by the addition of water is formed that once celebrated article known by the title of *mercurius vitæ*, or *Algeroth's powder*. This preparation, though never used by itself, is employed both by the Edinburgh and by some of the foreign colleges, in the formation of emetic tartar, the most useful of all the antimonials. And although chemists are not altogether agreed with regard to the best mode of making the tartarized antimony, yet we shall afterwards have occasion to observe, when treating of that article, that the preparation of it from the muriated antimony, or rather from its precipitate (*Algeroth's powder*), is perhaps the best mode which has

yet been practised. And were it even with no other intention than this, a safe, easy, and cheap method of forming a muriated antimony, may be considered as an important improvement in our pharmacopœias.

Antimonial powder. L.

Take of antimony, coarsely powdered, hartshorn-shavings, each two pounds; mix, and put them into a wide red-hot iron pot, stirring constantly till the mass acquires a grey-colour. Powder the matter when cold, and put it into a coated crucible. Lute it another crucible inverted, which has a small hole in its bottom: augment the fire by degrees to a red heat, and keep it so for two hours. Lastly, reduce the matter, when cold, to a very fine powder.

In this preparation, the metallic part of the antimony in a state of calx will be united with that part of the hartshorn which is indestructible by the action of fire, viz. its absorbent earth. If this powder be properly prepared, it is of a white colour. It is a mild antimonial preparation, and is given as an alternative from three to six grains for a dose. In this quantity, however, it sometimes creates nausea, and even vomits. In larger doses it proves emetic, and operates by stool.

Precipitated sulphur of antimony. L.

Take of antimony, powdered, two pounds; water of pure kali, four pints; distilled water, three pints; Mix, and boil them with a slow fire for three hours, constantly stirring, and adding the distilled water as it shall be wanted; strain the hot ley through a double linen cloth, and into the liquor, whilst yet hot, drop by degrees as much diluted vitriolic acid as is sufficient to precipitate the sulphur. Wash off, with warm water, the vitriolated kali.

Golden sulphur of antimony. E.

Boil, in an iron pot, four pounds of caustic ley diluted with three pints of water, and throw in by degrees two pounds of powdered antimony; keeping them continually stirring with an iron spatula for three hours, over a gentle fire, and occasionally supplying more water. The liquor loaded with the sulphur of antimony being then strained through a woollen cloth, drop into it gradually, while it continues hot, so much spirit of nitre, diluted with an equal quantity of water, as shall be sufficient to precipitate the sulphur, which is afterwards to be carefully washed with hot water.

The foregoing preparations are not strictly sulphurs; they contain a considerable quantity of the metallic part of the antimony, which is reducible from them by proper fluxes. These medicines must needs be liable to great variation in point of strength; and in this respect they are, perhaps, the most precarious, though some have affirmed that they are the most certain, of the antimonial medicines.

They prove emetic when taken on an empty stomach, in a dose of four, five, or six grains; but at present they are scarcely prescribed with this intention; being chiefly used as alterative deobstruents, particularly in cutaneous disorders. Their emetic quality is easily blunted, by making them up into pills with resins

sine or extracts, and giving them on a full stomach: with these cautions they have been taken in the quantity of 16 grains a-day, and continued for a considerable time, without occasioning any disturbance upwards or downwards. As their strength is precarious, they should be taken at first in very small doses, and increased by degrees according to their effect.

A composition of the golden sulphur, with sweet mercury, has been found a powerful, yet safe alterative, in cutaneous disorders; and has completed a cure after salivation had failed. In venereal cases, likewise, this medicine has produced excellent effects. A mixture of equal parts of the sulphur and calomel (well triturated together, and made into pills with extracts, &c.) may be taken from four to eight or ten grains, morning and night; the patient keeping moderately warm, and drinking after each dose a draught of a decoction of the woods, or other similar liquor. This medicine generally promotes perspiration, scarcely occasioning any tendency to vomit or purge, or affecting the mouth.

Tartarized antimony. L.

Take of crocus of antimony, powdered, one pound and an half; crystals of tartar, two pounds; distilled water, two gallons: boil in a glass vessel about a quarter of an hour; filter through paper, and set aside the strained liquor to crystallize.

Emetic tartar. E.

Take of the butter of antimony what quantity you choose; pour it into warm water, in which so much of the purified vegetable fixed alkali has been previously dissolved, that the antimonial powder may be precipitated, which, after being well washed, is to be dried. Then to five pounds of water add of this powder nine drams, of crystals of tartar, beat into a very fine powder, two ounces and a half; boil for a little till the powders be dissolved. Let the strained solution be slowly evaporated in a glass vessel to a pellicle, so that crystals may be formed.

We have here two modes of making the most common, and perhaps we may add the most useful, of all the antimonial preparations, long known in the shops under the name of *emetic tartar*. These modes differ considerably from each other; but in both, the reguline part of the antimony is united with the acid of the tartar. It is perhaps difficult to say to which mode of preparation the preference is to be given; for on this subject the best chemists are still divided in their opinion. The mode directed by the London college is nearly the same with that in former editions of their pharmacopœia, while that now adopted by the Edinburgh college in which they have nearly followed the Pharmacopœia Rossica, is of later date. That in both ways a good emetic tartar may be formed, is very certain: but in our opinion, when it is formed of the precipitate from the muriatic acid, or the *poudre d'Algerutti*, as it has been called, there is the least chance of its being uncertain in its operation: and this method comes recommended to us on the authority of Bergman, Scheele, and some other of the first names in chemistry. Bergman advises, that the calx be precipitated by simple water, as being least liable to variation; and this is the direction followed in the Phar-

macopœia Rossica. But when the calx is precipitated by an alkaline ley, as is directed by the Edinburgh college, it is more certainly freed from the muriatic acid, and will of course be milder.

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In the after part of the process, whether precipitate or crocus have been used, the quantity of the antimonial ought always to be some drams more than is absolutely necessary for saturating the acid of tartar, so that no crystals may shoot which are not impregnated with the active metallic part of the antimony. And in order to secure an uniform strength, some attention is necessary in collecting the crystals, as some may contain more metal than others. After they are all separated from the liquor, they ought to be beat together in a glass mortar into a fine powder, that the medicine may be of uniform strength.

Emetic tartar is, of all the preparations of antimony, the most certain in its operation.

It will be sufficient, in considering the medicinal effects of antimonials, that we should observe, once for all, that their emetic property depends on two different conditions of the reguline part: the first is where the reguline part is only active, by being rendered so from meeting with an acid in the stomach: the second is where the reguline part is already joined with an acid, rendering it active. It is obvious, that those preparations, reducible to the first head, must always be of uncertain operation. Such then is the equal uncertainty in the chemical condition and medicinal effects of the croci, the hepata, and the calces; all of which processes are different steps or degrees of freeing the reguline part from sulphur and phlogiston. It is equally plain, that the preparations coming under the second head must be always constant and certain in their operation. Such a one is emetic tartar, the dose and effects of which we can measure with great exactness.

The title of this medicine expresses its principal operation. It is one of the best of the antimonial emetics, acting more powerfully than the quantity of crocus contained in it would do by itself, though it does not so much ruffle the constitution. And indeed antimonials in general, when thus rendered soluble by vegetable acids, are more safe and certain in their effects than the violent preparations of that mineral exhibited by themselves; the former never varying in their action from a difference in the food taken during their use, or other similar circumstances; which occasioning more or less of the others to be dissolved, make them operate with different degrees of force. Thus, crude antimony, where acid food has been liberally taken, has sometimes proved violently emetic; whilst in other circumstances it has no such effect.

The dose of emetic tartar, when designed to produce the full effect of an emetic, is from two to four grains. It may likewise be advantageously given in much smaller doses as a nauseating and sudorific medicine.

Trisified antimony. L.

Take of powdered antimony, four ounces. Calcine it in a broad earthen vessel, with a fire gradually raised, stirring with an iron rod until it no longer emits a sulphureous smoke. Put this powder into a crucible, so as to fill two-thirds of it. A cover being fitted

on, make a fire under it, at first moderate, afterwards stronger, until the matter be melted. Pour out the melted glass.

Glass of antimony. E.

266 Strew antimony, beat into a coarse powder like sand, upon a shallow unglazed earthen vessel, and apply a gentle heat underneath, that the antimony may be heated slowly; keeping it at the same time continually stirring to prevent it from running into lumps. White vapours of a sulphureous smell will arise from it. If they cease to exhale with the degree of heat first applied, increase the fire a little, so that vapours may again arise: go on in this manner, till the powder, when brought to a red heat, exhales no more vapours. Melt the calx in a crucible with an intense heat, till it assumes the appearance of melted glass: then pour it out on a heated brass plate or dish.

The calcination of antimony, in order to procure transparent glass, succeeds very slowly, unless the operator be wary and circumspect in the management of it. The most convenient vessel is a broad shallow dish, or a smooth flat tile, placed under a chimney. The antimony should be the purer sort, such as is usually found at the apex of the cones; this, grossly powdered, is to be evenly spread over the bottom of the pan, so as not to lie above a quarter of an inch thick on any part. The fire should be at first no greater than is just sufficient to raise a fume from the antimony, which is to be now and then stirred: when the fumes begin to decay, increase the heat, taking care not to raise it so high as to melt the antimony, or run the powder into lumps; after some time the vessel may be made red-hot, and kept in this state until the matter will not, upon being stirred, any longer fume. If this part of the process be duly conducted, the antimony will appear in an uniform powder, without any lumps, and of a grey colour.

With this powder fill two-thirds of a crucible, which is to be covered with a tile, and placed in a wind-furnace. Gradually increase the fire till the calx be in perfect fusion, when it is to be now and then examined by dipping a clean iron wire into it. If the matter which adheres to the end of the wire appears smooth and equally transparent, the vitrification is completed, and the glass may be poured out upon a hot smooth stone or copperplate, and suffered to cool slowly to prevent its cracking and flying in pieces. It is of a transparent yellowish red colour.

The glass of antimony usually met with in the shops, is said to be prepared with certain additions; which may, perhaps, render it not so fit for the purpose here designed. By the method above directed, it may be easily made of the requisite perfection without any addition.

As antimony may be rendered nearly or altogether inactive by calcination, it might be expected that the calx and glass of the present process would be likewise inert. But here the calcination is far less perfect than in the other case, where the inflammable principle of the regulus is totally burnt out by deflagration with nitre; there the calx is of perfect whiteness, and a glass made from that calx (with the addition of any saline flux, for of itself it will not vitrify) has little colour:

but here so much of the inflammable principle is left, that the calx is grey, and the glass of a high colour. The calcined antimony is said by Boerhaave to be violently emetic. Experience has shown that the glass is so, inasmuch as to be unfit for internal use. At present it is chiefly employed in forming some other antimonial preparations, particularly the cerated glass of antimony, the next article to be mentioned; and the wine of antimony, afterwards to be treated of under the head of wines. It is also not unfrequently employed in the formation of emetic tartar; and it was directed for that purpose in the last edition of the Edinburgh pharmacopœia, being perhaps even superior to the crocus of antimony.

Cerated glass of antimony. E.

Take of yellow wax, a dram; glass of antimony, reduced into powder, an ounce. Melt the wax in an iron vessel, and throw into it the powdered glass: keep the mixture over a gentle fire for half an hour, continually stirring it; then pour it out on paper, and when cold grind it into powder. 267

The glass melts in the wax with a very gentle heat: after it has been about twenty minutes on the fire, it begins to change its colour, and in ten more comes near to that of Scotch snuff; which is a mark of its being sufficiently prepared; the quantity set down above looks about one dram of its weight in the process.

This medicine was for some time much esteemed in dysenteries: several instances of its good effects in these cases may be seen in the fifth volume of the Edinburgh Essays, from which the above remarks on the preparations are taken. The dose is from two or three grains to twenty, according to the age and strength of the patient. In its operation, it makes some persons sick and vomit; it purges almost every one: though it has sometimes effected a cure without occasioning any evacuation or sickness. It is now, however, much less used than formerly.

Mr Geoffroy gives two pretty singular preparations of glass of antimony, which seem to have some affinity with this. One is made by digesting the glass, very finely levigated, with a solution of mastich made in spirit of wine, for three or four days, now and then shaking the mixture; and at last evaporating the spirit so as to leave the mastich and glass perfectly mixed. Glass of antimony thus prepared, is said not to prove emetic, but to act merely as a cathartic, and that not of the violent kind. A preparation like this was first published by Hartman, under the name of *Glystia*.

The other preparation is made by burning spirit of wine on the glass three or four times, the powder being every time exquisitely rubbed upon a marble. The dose of this medicine is from ten grains to 20 or 30: it is said to operate mildly both upwards and downwards, and sometimes to prove sudorific.

Ceruse of antimony. Brun.

Take of regulus of antimony, one part; nitre, three parts. Deflagrate them together in the manner directed for the calcined antimony. 268

The result of this process and that formerly directed for the calcined antimony are nearly the same.

It is not necessary to use so much nitre here as when antimony

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antimony itself is employed: for the sulphur which the crude mineral contains, and which requires for its dissipation nearly an equal weight of nitre to the antimony, is here already separated. Two parts of nitre to one of the regulus are sufficient. It is better, however, to have an over, than an under, proportion of nitre, lest some parts of the regulus should escape being sufficiently calcined.

It may be proper to observe, that though crude antimony and the regulus yield the same calces, yet the salts separated in washing the calces are very different. As crude antimony contains common sulphur, the acid of the sulphur unites with the alkaline basis of the nitre, and the result is a neutral salt. As the regulus contains the phlogistic, or inflammable principle, but no sulphur, the nitre is alkalisied, as it would be by charcoal or such like inflammable bodies, and is at the same time rendered more acrimonious than the common alkaline salts; probably owing to the calx absorbing the air of the alkali. If only equal parts of the regulus and nitre be employed, and the fire kept up strong for an hour or more, the salt will prove more caustic than even the potential caustic of the shops. But the causticity of the salt will still be far greater, if, instead of the simple regulus of antimony, the martial regulus be used.

Kermes mineral. Suec.

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Take of crude antimony, powdered, half a pound; fixed vegetable alkali, two pounds; boiling water, eight pounds. Boil them together in an iron pot for a quarter of an hour, continually stirring the mixture with an iron spatula, and filter as speedily as possible while it is hot. The filtered liquor, set in cool places, will soon deposit a powder, which must be repeatedly washed, first with cold and afterwards with warm water, until it be perfectly insipid.

This medicine has of late been greatly esteemed in France, especially under the names of *Kermes mineral*, *pulvis Cartesius*, *poudre des Chartreux*, &c. It was originally a preparation of Glauber, and for some time kept a great secret, till at length the French king purchased the preparation from M. de la Ligerie, for a considerable sum, and communicated it to the public in the year 1720. In virtue, it is not different from the sulphurs above-mentioned; all of them owe their efficacy to a part of the regulus of the antimony, which the alkaline salt, by the mediation of the sulphur, renders soluble in water.

Chemists are, however, divided in their opinions with respect to the precise chemical condition of the reguline part in the preparations called *Lepota of antimony*. Some have alleged that they contain not a particle of alkaline salt: it is at any rate certain, that the quantity and condition of the reguline part must vary according to the different proportions of the ingredients, the time of the precipitation, the greater or less degree of causticity of the alkali employed, and several other circumstances. At best, the whole of them are liable to the same uncertainty in their operation as the calces of antimony.

Panacea of antimony.

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Take of antimony, six ounces; nitre, two ounces;

common salt, an ounce and a half; charcoal, an ounce. Reduce them into a fine powder, and put the mixture into a red-hot crucible, by half a spoonful at a time, continuing the fire a quarter of an hour after the last injection: then either pour the matter into a cone, or let it cool in the crucible; which when cold must be broken to get it out. In the bottom will be found a quantity of regulus; above this a compact liver-coloured substance; and on the top a more spongy mass: this last is to be reduced into powder, elaborated with water, and dried, when it appears of a fine golden colour.

This preparation is supposed to have been the basis of Lockyer's pills, which were formerly a celebrated purge. Ten grains of the powder, mixed with an ounce of white sugar candy, and made up into a mass with mucilage of gum tragacanth, may be divided into an hundred small pills; of which one, two, or three, taken at a time, are said to work gently by stool and vomit. The compact liver coloured substance, which lies immediately above the regulus, operates more severely. This last appears to be nearly of the same nature with the crocus of antimony, and the former with the golden sulphur.

CHAP. XI. Preparations of silver.

Nitrated silver. L.

Take of silver, one ounce; diluted nitrous acid, four ounces. Dissolve the silver in the nitrous acid, in a glass vessel, over a sand-heat; then evaporate with an heat gently raised: afterwards melt the residuum in a crucible, that it may be poured into proper forms, carefully avoiding too great a heat.

Salt of silver, commonly called lunar caustic. E.

Take of purest silver, beat into plates, and cut in pieces, four ounces; weak nitrous acid, eight ounces; purest water, four ounces. Dissolve the silver in a phial with a gentle heat, and evaporate the solution to dryness. Then put the mass into a large crucible, and apply the heat, at first gently, but augment it by degrees till the mass flows like oil; then pour it into iron moulds, previously heated, and greased with tallow.

These processes do not differ in any material particular. But the name of *nitrated silver* is preferable to the more indefinite one of *salt of silver*.

Strong spirit of nitre will dissolve somewhat more than half its weight of pure silver; and the weaker of the aquafortis, formerly described, proportionally less, according to their quantity of pure nitrous acid. Sometimes this spirit contains a portion of the vitriolic or marine acids; which, however minute, renders it unfit for dissolving this metal, and should therefore be carefully separated before the solution be attempted. The method which the refiners employ for examining the purity of their aquafortis, and purifying it if necessary, is to let fall into it a few drops of a perfect solution of silver already made: if the liquor remain clear, and grow not in the least turbid or whitish, it is fit for use; otherwise, they add a small quantity more of the solution, which immediately turns the whole of a milky white colour; the mixture being then suffered to rest for some time, deposits a white sediment; from which it is warily decanted, examined afresh, and,

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if need be, farther purified by a fresh addition of the solution.

The silver beat into thin plates, as directed in the second of the above processes, needs not be cut in pieces: the solution will go on the more speedily if they are only turned round into spiral circumvolutions, so as to be conveniently got into the glass, with care that the several surfaces do not touch each other. By this management, a greater extent of the surface is exposed to the action of the menstruum, than when the plates are cut in pieces and laid above each other. Good aquafortis will dissolve about half its weight of silver; and it is not advisable to use a greater quantity of the menstruum than is sufficient for effecting the solution, for all the surplus must be evaporated in the subsequent fusion.

It is necessary to employ very pure water; for if hard water were used in this process, the nitrous acid would forsake a part of the silver to join with the calcareous earth of the imperfect nitrous selenite; whereby a part of the silver would be precipitated.

The crucible ought to be large enough to hold five or six times the quantity of the dry matter; for it bubbles and swells up greatly, and is consequently apt to run over. During this time, also, little drops are now and then spurted up, whose causticity is increased by their heat, against which the operator ought therefore to be on his guard. The fire must be kept moderate till this ebullition ceases, and till the matter becomes consistent in the heat that made it boil before: then quickly increase the fire till the matter flows thin at the bottom like oil, when it is to be immediately poured into the mould, without waiting till the fumes cease to appear; for when this happens, the preparation proves not only too thick to run freely into the mould; but likewise less corrosive than it is expected to be.

For want of a proper iron mould, one may be formed of tempered tobacco-pipe clay, not too moist, by making in a lump of it, with a smooth stick first greased, as many holes as there is occasion for: pour the liquid matter into these cavities, and when congealed take it out by breaking the mould. Each piece is to be wiped clean from the grease, and wrapt up in soft dry paper, not only to keep the air from acting on them, but likewise to prevent their corroding or discolouring the fingers in handling.

This preparation is a strong caustic; and is frequently employed as such for consuming warts and other fleshy excrescences, keeping down fungous flesh in wounds or ulcers, and other similar uses. It is rarely applied where a deep eschar is required, as in the laying open of imposthumations and tumors; for the quantity necessary for these purposes, liquefying by the moisture of the skin, spreads beyond the limits within which it is intended to operate.

The lunar pills.

Dissolve pure silver in aquafortis, as in the foregoing process; and after due evaporation, set the liquor aside to crystallize. Let the crystals be again dissolved in common water, and mixed with a solution of equal their weight of nitre. Evaporate this mixture to dryness, and continue the exsiccation with a

gentle heat, keeping the matter constantly stirring till no more fumes arise.

Here it is necessary to continue the fire till the fumes entirely cease, as more of the acid is required to be dissipated than in the preceding process. The preparation is, nevertheless, in taste very sharp, intensely bitter and nauseous: applied to ulcers, it acts as a caustic, but it is much milder than the foregoing. Boerhaave, Boyle, and others, commend it highly in hydropic cases. The former assures us, that two grains of it made into a pill with crumb of bread and a little sugar, and taken on an empty stomach (some warm water, sweetened with honey, being drank immediately after), purge gently without griping, and bring away a large quantity of water, almost without the patient's perceiving it: that it kills worms, and cures many inveterate ulcerous disorders. He nevertheless cautions against using it too freely, or in too large a dose; and observes, that it always proves corrosive and weakening, especially to the stomach.

CHAP. XII. Preparations of iron.

Ammoniacal iron. L.

Take of iron filings, one pound; sal ammoniac, two pounds. Mix, and sublime. What remains at the bottom of the vessel mix by rubbing together with the sublimed matter, and again sublime.

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Martial flowers, commonly called Ens Veneris. E.

Take of colcothar of martial vitriol, washed and well dried; sal ammoniac, equal weights. Having mixed them well, sublime.

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Though the mode of preparation directed by the two colleges is here different, yet the preparation is fundamentally the same; and it is perhaps difficult to say which mode of preparation is to be preferred as the easiest and best.

The name of *ens veneris* has by some been very improperly applied to this preparation, as it contains not a particle of copper. The proper *ens veneris* is prepared from the blue vitriol; but, as we shall soon see, is often not materially different from the *martial flowers*.

The success of this process depends principally on the fire being hastily raised, that the sal ammoniac may not sublime before the heat be sufficient to enable it to carry up a sufficient quantity of the iron. Hence glass vessels are not so proper as earthen or iron ones: for when the former are used, the fire cannot be raised quickly enough, without endangering the breaking of them. The most convenient vessel is an iron pot; to which may be luted an inverted earthen jar, having a small hole in its bottom to suffer the elastic vapours, which arise during the operation, to escape. It is of advantage to thoroughly mix the ingredients together, moisten them with a little water, and then gently dry them; and to repeat the pulverization, humectation, and exsiccation, two or three times, or oftener. If this method be followed, the sal ammoniac may be increased to three times the quantity of the iron, or farther; and a single sublimation will often be sufficient to raise flowers of a very deep orange colour.

This preparation is supposed to be highly aperient and

and attenuating; though no otherwise so than the rest of the chalybeates, or at most only by virtue of the saline matter joined to the iron. It has been found of service in hysterical and hypochondriacal cases, and in distempers proceeding from a laxity and weakness of the solids, as the rickets. It may be conveniently taken in the form of a bolus, from two or three grains to ten: it is nauseous in a liquid form (unless in spirituous tincture); and occasions pills to swell and crumble, except such as are made of the gums.

Rust of iron. L.

276 Take of iron-filings, one pound; expose them to the air, often moistening them with water, until they be corroded into rust; then powder them in an iron mortar, and wash off with distilled water the very fine powder. But the remainder, which cannot by moderate rubbing be reduced into a powder capable of being easily washed off, must be moistened, exposed to the air for a longer time, and again powdered and washed as before. Let the washed powder be dried.

Rust of iron, commonly called prepared iron filings. E.

Set purified filings of iron in a moist place, that they may turn to rust, which is to be ground into an impalpable powder.

The cleansing of iron filings by means of a magnet is very tedious, and does not answer so well as might be expected; for if they be rusty, they will not be attracted by it, or not sufficiently: nor will they by this means be entirely freed from brass, copper, or other metallic substances which may adhere to them. It appears from the experiments of Henckel, that if iron be mixed by fusion with even its own weight of any of the other metals, regulus of antimony alone excepted, the compound will be vigorously attracted by the loadstone. The rust of iron is to be procured at a moderate rate from the dealers in iron, free from any impurities, except such as may be washed off by water.

The rust of iron is preferable as a medicine to the calces or croci, made by a strong fire. Hoffman relates, that he has frequently given it with remarkable success in obstinate chlorotic cases accompanied with excessive headaches and other violent symptoms; and that he usually joined with it pimpinella, arum root, and salt of tartar, with a little cinnamon and sugar. The dose is from four or five grains to twenty or thirty. Some have gone as far as a dram: but all the preparations of this metal answer best in small doses, which should rather be often repeated than enlarged.

Tartarized iron. L.

277 Take of filings of iron, one pound; powdered crystals of tartar, two pounds. Mix them with distilled water into a thick paste. Expose it to the air in an open earthen vessel for eight days; then grind the matter, dried in a bath of sand, to a very fine powder.

This is an useful preparation of iron, in which that metal is chiefly brought to a saline state by means of the cream of tartar. It has now for the first time a place in the London pharmacopœia; but it had before

been introduced into some of the foreign ones, particularly the pharmacopœia Genevensis, under the title of *maris tartarizatus*; and indeed it is almost precisely the same with the *maris scabulis* of the old editions of the Edinburgh pharmacopœia.

Vitriolated iron. L.

Take of filings of iron, vitriolic acid, each eight ounces; distilled water, three pints. Mix them in a glass vessel; and when the effervescence has ceased, place the mixture for some time upon hot sand; then pour off the liquor, straining it through paper; and after due exhalation set it aside to crystallize.

Vitriol of iron, or salt of steel. E.

Take of purified filings of iron, six ounces; vitriolic acid, eight ounces; water, two pounds and a half. Mix them; and when the effervescence ceases, let the mixture stand for some time upon warm sand; then strain the liquor through paper, and after due evaporation set it aside to crystallize.

During the dissolution of the iron an elastic vapour rises, which on the approach of flame catches fire and explodes, so as sometimes to burst the vessel. To this particular therefore the operator ought to have due regard.

This vapour is also noxious to animal life. It is the inflammable air of Dr Priestley.

The chemists are seldom at the trouble of preparing this salt according to the directions above given; but in its stead substitute common green vitriol, purified by solution in water, filtration, and crystallization. The only difference between the two is, that the common vitriol contains somewhat more metal in proportion to the acid: and hence in keeping, its green colour is much sooner debased by a rusty brownish cast. The superfluous quantity of metal may be easily separated, by suffering the solution of the vitriol to stand for some time in a cold place, when a brownish yellow ochery sediment will fall to the bottom; or it may be perfectly dissolved, and kept suspended by a suitable addition of oil of vitriol. If the vitriol be suspected to contain any cupreous matter, which the common English vitriol seldom does, though almost all the foreign vitriols do, the addition of some bright iron wire to the solution will both discover, and effectually separate, that metal: for the acid quits the copper to dissolve a proportionable quantity of the iron; and the copper, in its separation from the acid, adheres to the undissolved iron, and forms a skin of a true copper colour on its surface. Even a vitriol of pure copper may, on this principle, be converted into a pure vitriol of iron.

But though the vitriolic acid appears in this operation to have so much stronger a disposition to unite with iron than with copper, that it totally rejects the latter when the former is presented to it; the operator may nevertheless give a dangerous impregnation of copper to the purest and most saturated solution of iron in the vitriolic acid, by the use of copper vessels. If the martial solution be boiled in a copper vessel, it never fails to dissolve a part of the copper, distinguishable by its giving a cupreous stain to a piece of bright iron immersed in it. By the addition of the iron, the

copper

Preparations and Compositions.

copper is separated; by boiling it again without iron, more of the copper is dissolved; and this may in like manner be separated by adding more iron.

The salt of steel is one of the most efficacious preparations of this metal; and not unfrequently made use of in cachectic and chlorotic cases, for exciting the uterine purgations, strengthening the tone of the viscera, and destroying worms. It may be conveniently taken in a liquid form, largely diluted with water: Boerhaave directs it to be dissolved in an hundred times its weight of water, and the solution to be taken in the dose of twelve ounces on an empty stomach, walking gently after it. Thus managed, he says, it opens the body, proves diuretic, kills and expels worms, tinges the excrements black, or forms them into a matter like clay, strengthens the fibres, and thus cures many different distempers. The quantity of vitriol in the above dose of the solution is fifty-seven grains and a half; but in common practice, such large doses of this strong chalybeate are never ventured on. Four or five grains, and in many cases half a grain, are sufficient for the intention in which chalybeate medicines are given. Very dilute solutions, as that of a grain of the salt in a pint of water, may be used as succedanea to the natural chalybeate waters, and will in many cases produce similar effects.

Colcothar of vitriol. E.

Let calcined vitriol be urged with a violent fire till it becomes of a very red colour.

In this preparation, the iron which had been brought to a saline state by means of the acid of vitriol, is again deprived of that acid by the action of fire. It may be considered therefore as differing in nothing from the residuum which remains in the retort, when vitriolic acid is distilled from martial vitriol. The colcothar is very rarely employed by itself for medical purposes; but it is used in the preparation of some other chalybeates, particularly the martial flowers, when prepared according to the method directed by the Edinburgh college.

Martial athiops. Gen.

Take of the rust of iron, as much as you please; olive oil, a sufficient quantity to make it into a paste. Let this be distilled in a retort by a strong fire to dryness. Keep the residuum reduced to a fine powder in a close vessel.

An article under this name had formerly a place in some of the old pharmacopœias, and is described by Lemery in the Memoirs of the French Academy; but it was formed by a tedious process, continued for several months by the aid of water. Here the process is much shorter, and is supposed to give nearly the same product. Some have recommended it, on the supposition that the iron is here obtained in a very subtle state; but it is not in general supposed to have any advantage over the other more common chalybeates.

Opening and astringent crocus of iron.

These are prepared by mixing iron filings with twice their weight of powdered sulphur, deflagrating in a red-hot crucible; and in the one case keeping the preparation over the fire till it assumes a red colour;

in the other, by reverberating it for a long time in the most extreme degree of heat.

Preparations under these names still retain a place in some of the foreign pharmacopœias, but they are variously prepared. They may, however, be considered as possessing the same medical powers: and although the preparations mentioned above probably differ from each other in their virtues, yet that difference is not of such a nature as is imported by the titles by which they are usually distinguished. For all the preparations of iron probably act by an astringent quality; and that which is above denominated the *astringent crocus* has probably least effect in that way. At one period, these preparations were not unfrequently in use; and they were given in the form of bolus, electuary, or pill, from a few grains to a scruple; but among us they are at present so little in use as to have no place in our pharmacopœias.

CHAP. XIII. *Preparations of Mercury.*

We have already treated of mercury in various parts of our work as we found occasion, and what we have already discussed it is unnecessary to repeat. See MERCURY, CHEMISTRY-Index, MATERIA MEDICA. p. 653. METALLURGY, and QUICKSILVER. On the whole, it appears evident that there is no article which has been employed for medical purposes in a greater variety of forms. The colleges of London and Edinburgh have admitted into their pharmacopœias only a few of these; but from the selection they have made, there is reason to believe that every useful purpose for which mercury has been employed may be answered; and these purposes are both numerous and considerable. For it is at least very generally allowed among intelligent practitioners, that there are few articles kept in the shops of our apothecaries which can be considered as so extensively useful.

Mercury or quicksilver, in its crude state, is a ponderous metallic fluid, totally volatile in a strong fire, and calcinable by a weaker one (though very difficultly) into a red powdery substance. It dissolves in the nitrous acid, is corroded by the vitriolic, but not acted on by the marine in its liquid state: it nevertheless may be combined with this last skilfully applied in the form of fume. Quicksilver unites by trituration with earthy, unctuous, resinous, and other similar substances, so as to lose its fluidity: triturated with sulphur, it forms a black mass, which by sublimation changes into a beautiful red one.

For the general virtues of the mercurial preparations, see some of the articles above referred to, and MEDICINE. Here we shall only observe, that while in certain circumstances they act as stimulants, and even as corrosives, to the parts to which they are applied; under a different management, when introduced into the habit, they seem to forward circulation through even the smallest and most remote vessels of the body; and may be so managed as to promote all the excretions. But while they thus operate as a powerful stimulus to the sanguiferous, and probably also to the lymphatic system, they seem to exert but little influence on the nervous system. By this means they prove eminently serviceable in some inveterate chronical disorders, proceeding from oblitinate obstructions of the glands. Crude mercury

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has no effect this way. Resolved into fume, or divided into minute particles, and prevented from reuniting by the interposition of other substances, it operates very powerfully, unless the dividing body be sulphur, which restrains its action. Combined with a small quantity of the mineral acids, it acts effectually, though in general mildly; with a larger, it proves violently corrosive.

Purified quicksilver. L.

Take of quicksilver, filings of iron, each four pounds.

Rub them together, and distil from an iron vessel.

As in the distillation of quicksilver glass retorts are very liable to be broken, an iron one is here with propriety directed: and by the addition of the filings of iron, matters which might otherwise arise with the quicksilver will be more apt to be detained in the retort. But still this happens so readily, even merely with that degree of heat which is necessary to elevate the mercury, that it is very doubtful whether much advantage be obtained from this process; and accordingly it has now no place in the pharmacopœia of the Edinburgh college.

Acetated quicksilver. L.

Take of purified quicksilver, one pound; diluted nitrous acid, two pounds; water of kali, as much as is sufficient. Mix the quicksilver with the acid in a glass vessel, and dissolve it in a sand-bath; then drop in by degrees the water of kali, that the calx of quicksilver may be precipitated; wash this calx with plenty of distilled water, and dry it with a gentle heat. These things being done, take of the calx of quicksilver, above described, one pound; acetic acid, as much as is necessary to dissolve the calx. Mix them in a glass vessel; and the solution being completed, strain it through paper; then evaporate it till a pellicle appears, and set it aside to crystallize. Keep these crystals in a vessel close stopped.

Of all the saline preparations of mercury, it has long been the opinion of the best chemists, that those in which it was brought to a saline form, by means of acetic acid, would be the mildest; and such a preparation was conjectured to be the basis of a celebrated pill, prepared and sold by Mr Keyser. It was, however, found to be a very difficult matter to imitate his pill, or to obtain a combination of mercury with the acetic acid: but not long since, the process for preparing these pills was published by authority at Paris, after being purchased by the French king. The process here described though in some particulars much less operose than that of Mr Keyser, yet nearly approaches to it, and furnishes us with the mildest of the saline mercurials.

Calcined quicksilver. L.

Take of purified quicksilver, one pound; expose the quicksilver in a flat-bottomed glass cucurbit, to an heat of about 600 degrees in a sand-bath, till it becomes a red powder.

This preparation may now be made in a shorter time than by the process formerly directed in the London pharmacopœia, which in general required several months: for the access of air, without which calcina-

tion cannot be performed, was then very much excluded. Still, however, the process is a tedious one, and might perhaps be improved. A vessel might be so contrived, as to occasion a continual flux of air over the surface of the mercury.

This preparation is highly esteemed in venereal cases, and supposed to be the most efficacious and certain of all the mercurials. It may be advantageously given in conjunction with opiates: a bolus or pill, containing from half a grain to two grains of this calx, and a quarter or half a grain or more of opium, with the addition of some warm aromatic ingredient, may be taken every night. Thus managed, it acts mildly, though powerfully, as an alterative and diaphoretic: given by itself in larger doses, as four or five grains, it proves a rough emetic and cathartic.

Ash-coloured powder of mercury. E.

Take of quicksilver, weak nitrous acid, equal weights.

Mix them so as to dissolve the quicksilver; dilute the solution with pure water, and add spirit of sal ammoniac as much as is sufficient to separate the mercury perfectly from the acid; then wash the powder in pure water, and dry it.

In this process the mercurial nitre is decomposed; the precipitate, therefore, is a calx of mercury, and the clear liquor a solution of nitrous ammoniac. From the great attraction which the nitrous acid has for phlogiston, or from its ready disposition to part with pure air, the precipitates of mercury from its solution in this acid are more completely in the state of a calx than those from any other menstruum. There are, however, several niceties to be observed in conducting this process. If we employ too small a proportion of acid, and assist the solution by heat, the solution will contain an excess of calx capable of being separated by the water; and the whole precipitate from such a solution would be of a white colour. If, on the other hand, we employ too large a proportion of acid, the mercury is then so far calcined as to be capable of being dissolved by the volatile alkali; and this might happen in proportion as the quantity should be superabundant to the neutralization of the acid. The use of the water is to dissolve the nitrous ammoniac as fast as it is formed, and thereby prevent it from falling down and mixing with the precipitate. It is necessary to employ the purest water. If such be used as contains a nitrous selenite, not only a part of the mercury may be precipitated by the base of the selenite, but this last might also be deposited by the succeeding addition of the alkali.

The ash coloured powder of mercury has of late years been much celebrated for the cure of venereal affections. It was first proposed by Dr Saunders to be made by precipitating the mercury from calomel, as the best substitute for the tedious and expensive process of the precipitate *per se*, and of the grey powder produced by triture with gum arabic. From the testimony of Dr Home, and several other practitioners, we have no doubt of its being a very valuable preparation of mercury. It may be given in a bolus or water, in the quantity of from one to six or seven grains: the dose being gradually increased according to its effects upon the patient.

Quicksilver with chalk. L.

Take of purified quicksilver, three ounces; powdered chalk, five ounces. Rub them together until the globules disappear.

In this preparation, as well as the two former, we have also the mercury in a state of calx; but in place of being brought to that state by the aid of fire or of acids, what may here be considered as calcination is effected by triture.

This preparation had no place in the former editions of the London pharmacopœia. A preparation nearly similar indeed, under the title of *mercurius alkalisatus*, in which crabs eyes were employed instead of chalk, had a place in the old editions of the Edinburgh pharmacopœia, but was rejected from the edition of 1744, and has never again been restored. One reason for rejecting it was its being liable to gross abuse in the preparation, by the addition of some intermedium, facilitating the union of mercury with the absorbent earth, but diminishing or altering its power. The present preparation is liable to the same objection. Some, however, are of opinion, that when duly prepared, it is an useful alternative. But there can be little doubt, that the absorbent earth, by destroying acid in the alimentary canal, will diminish the activity of the mercurial calx.

Muriated quicksilver. L.

- 289 Take of purified quicksilver, vitriolic acid, each two pounds; dried sea-salt, three pounds and an half. Mix the quicksilver with the acid in a glass vessel, and boil in a sand-heat until the matter be dried. Mix it, when cold, with the sea-salt, in a glass vessel; then sublime in a glass cucurbit, with a heat gradually raised. Lastly, let the sublimed matter be separated from the scorizæ.

Sublimate corrosive mercury. E.

- 290 Take of quicksilver, weak nitrous acid, each four ounces; calcined sea-salt, calcined vitriol, of each five ounces. Dissolve the quicksilver in the nitrous acid, and evaporate the solution to a white and thoroughly dry mass: then add the sea-salt and vitriol. Having ground and mixed them well together, put the whole into a phial, one half of which they ought to fill; then sublime in sand, first with a gentle, but afterwards with an increased, heat.

The sublimate prepared by either of these methods is the same, they both consist only of mercury and the acid of the sea-salt united together. In the process directed by the Edinburgh college, the materials being mixed and exposed to the fire, first the vitriol parts with its acid, which, dislodging those of the nitre and marine salt, takes their place. The marine acid, resolved into fume and assisted by the nitrous, dissolves the mercury, now also strongly heated. This acid, though it very difficultly acts on mercury, yet when thus once united with it, is more strongly retained thereby than any other acid. The nitrous spirit, therefore, having nothing to retain it (for its own basis and that of the sea-salt are both occupied by the vitriolic, and that which the vitriolic forsook to unite with these, is now scarcely combinable with it), arises; leaving the mercury and marine acid to sublime toge-

ther when the heat shall be strong enough to elevate them. Some small portion of the marine spirit arises along with the nitrous: and hence this compound acid has been usually employed instead of the *compound aquafortis*, to which it is similar, for making the red corrosive.

It appears, therefore, that the vitriol, and the bases of the nitre and sea-salt, are of no farther use in this process, than as convenient intermediums for facilitating the union of the mercury with the marine acids. They likewise serve to afford a support for the sublimate to rest upon, which thus assumes the form of a placenta or cake.

The process, however, now adopted by the London college, is a better and more simple one. There the mercury, corroded by the vitriolic acid into a white mass, is mixed with about an equal quantity of sea-salt, and set to sublime; the vitriolic acid quits the mercury to unite with the basis of the sea salt; and the acid of the sea-salt, now set at liberty, unites with the mercury, and sublimates with it into the compound required. The discovery of this method is generally attributed to Boulduc; though it is found also in Kunckel's *Laboratorium Chymicum*. When the process is conducted in this way, the residuous matter is a pure Glauber's salt, and the sublimate is also free of ferruginous matter; a greater or less quantity of which is very generally carried up along with the mercury when vitriol of iron is employed. Boulduc's method has therefore the advantage in this, that the proportion of mercury in a given quantity of sublimate must be less liable to variation.

If the mercury be corroded by the nitrous acid instead of the vitriolic, the event will be the same; that acid equally quitting the mercury, and setting loose the marine; and the sublimate made by this method is the same with the foregoing; but as the quantity of fixed matter is smaller, it more difficultly assumes the form of a cake. It requires indeed some skill in the operator to give it this appearance when either process is followed. When large quantities are made, this form may be easily obtained, by placing the matras no deeper in the sand than the surface of the matter contained in it; and removing a little of the sand from the sides of the glass, as soon as the flowers begin to appear in the neck; when the heat should likewise be somewhat lowered, and not at all raised during the whole process. The sublimation is known to be completed by the edges of the crystalline cake, which will form on the surface of the *caput mortuum*, appearing smooth and even, and a little removed from it.

Our apothecaries rarely, and few even of the chemists, attempt the making of this preparation themselves; greatest part of what is used among us comes from Venice and Holland. This foreign sublimate has been reported to be adulterated with arsenic. Some affirm, that this dangerous fraud may be discovered by the sublimate turning black on being moistened with alkaline ley; which by others is denied. As this point seemed of some importance to be determined, sundry experiments have been made with this view, which prove the insufficiency of alkalis for discovering arsenic. Alkaline ley, poured into a solution of pure arsenic, and into a mixture of the two solutions in different proportions, produced no blackness in any: and though

though the pure sublimate, and the mixtures of it with arsenic, exhibited some differences in these trials, yet these differences were neither so constant nor so strongly marked, as to be laid down universally for criteria of the presence or absence of arsenic: different specimens of sublimate, known to be pure, have been found to differ considerably in this respect; probably from their holding a little more or less mercury in proportion to the acid, or from their retaining some small portion of those acids which were employed in the preparation as intermedia.

Some chemists deny the practicability of this adulteration. There is a process common in books of chemistry, wherein sublimate and arsenic being mixed together, and set to sublime, do not arise in one mass, or yield any thing similar to the preparation here intended: the arsenic absorbs the acid of the sublimate, and is reduced thereby into a liquid or butyraceous consistence; while the mercury, thus freed from the acid, distils in its fluid form: if the quantity of arsenic be insufficient to decompose the whole of the sublimate, the remainder of the sublimate concretes distinct from the arsenical butter. From whence they conclude, that arsenic and sublimate cannot be united together into a crystalline cake, the form in which this preparation is brought to us.

The above experiment is not altogether decisive; for though arsenic and sulphur do not assume the required form by the common process, it is possible they may by some other management. It will therefore be proper to point out means for the satisfaction of those who may be desirous of convincing themselves of the genuineness of this important preparation. Let some of the sublimate, powdered in a glass mortar, be well mixed with twice its weight of black flux, and a little filings or shavings of iron; put the mixture into a crucible capable of holding four or five times as much; give a gradual fire till the ebullition ceases, and then hastily increase it to a white heat. If no fumes of a garlic smell can be perceived during the process, and if the particles of iron retain their form without any of them being melted, we may be sure that the mixture contained no arsenic.

Sublimate is a most violent corrosive, soon corrupting and destroying all the parts of the body it touches. A solution of it in water, in the proportion of about a dram to a quart, is used for keeping down proud flesh, and cleansing foul ulcers; and a more diluted solution as a cosmetic, and for destroying cutaneous insects. But a great deal of caution is requisite even in these external uses of it.

Some have nevertheless ventured to give it internally, in the dose of one-tenth or one-eighth of a grain. Boerhaave relates, that if a grain of it be dissolved in an ounce or more of water, and a dram of this solution, sweetened with syrup of violets, be taken twice or thrice a day, it will prove efficacious in many distempers thought incurable; but he particularly cautions us not to venture upon it, unless the method of managing it be well known.

Sublimate dissolved in vinous spirit has of late been given internally in larger doses; from a quarter of a grain to half a grain. This method of using it was brought into repute by Baron Van Swieten at Vienna, especially for venereal maladies; and several trials of

it have also been made in this kingdom with success. Eight grains of the sublimate are dissolved in sixteen ounces of rectified spirit of wine or proof-spirit; the rectified spirit dissolves it more perfectly, and seems to make the medicine milder in its operation than the proof-spirit of the original prescription of Van Swieten. Of this solution, from one to two spoonfuls, that is, from half an ounce to an ounce, are given twice a day, and continued till all the symptoms are removed; observing to use a low diet, with plentiful dilution, otherwise the sublimate is apt to purge, and gripe severely. It generally purges more or less at the beginning, but afterwards seems to operate chiefly by urine and perspiration.

Sublimate consists of mercury united with a large quantity of marine acid. There are two general methods of destroying its corrosive quality, and rendering it mild; the one is, combining with it as much fresh mercury as the acid is capable of taking up; and the other, by separating a part of the acid by means of alkaline salts and earths. On the first principle sweet mercury is formed; on the latter, white precipitate. But before entering on these, it is proper to give the following formula.

Solution of corrosive sublimate mercury. E.

Take of corrosive sublimate mercury, six grains; sal ammoniac, twelve grains. Dissolve in a pound of distilled water. If hard water be used for this purpose, the solution suffers a kind of decomposition from the nitrous selenite of the water.

The solution of corrosive sublimate in water is very much assisted by sal ammoniac. There was a practice some years ago, of mixing up this solution with wheat flour into the consistence of pills for internal use; and the quantity of sublimate in each pill was easily ascertained.

This solution may also be used for washing venereal and other sores; but in many instances it will be found too acrid for that purpose, and will require to be weakened by the addition of a portion of water.

Calomel. L.

Take of muriated quicksilver, one pound; purified quicksilver, nine ounces. Rub them together till the globules disappear, and then sublime the mass. In the same manner repeat the sublimation four times. Afterwards rub the matter into a very fine powder, and wash it by pouring on boiling distilled water.

Sweet mercury. E.

Take of corrosive mercury sublimate, reduced to a powder in a glass mortar, four ounces; pure quicksilver, three ounces and a half. Mix them well together, by long trituration in a glass or marble mortar, until the quicksilver ceases to appear. Put the powder into an oblong phial, of such a size that only one-third of it may be filled; and set the glass in sand, that the mass may sublime. After the sublimation, break the glass; and the red powder which is found in its bottom, with the whitish one that sticks about the neck, being thrown away, let the white mercury be sublimed again three or four times, and reduced to a very fine powder.

The trituration of corrosive sublimate with quicksilver is a very noxious operation: for it is almost impossible, by any care, to prevent the lighter particles of the former from rising so as to affect the operator's eyes and mouth. It is nevertheless of the utmost consequence, that the ingredients be perfectly united before the sublimation is begun. It is necessary to pulverize the sublimate before the mercury is added to it: but this may be safely performed with a little caution; especially if during the pulverization the matter be now and then sprinkled with a little spirit of wine: this addition does not at all impede the union of the ingredients, or prejudice the sublimation: it will be convenient not to close the top of the subliming vessel with a cap of paper at first (as is usually practised), but to defer this till the mixture begins to sublime, that the spirit may escape.

The rationale of this process deserves particular attention; and the more so, as a mistaken theory herein has been productive of several errors with regard to the operation of mercurials in general. It is supposed, that the *dulcification*, as it is called, of the corrosive mercury is owing to the spiculæ or sharp points, on which its corrosiveness depends, being broken and worn off by the frequent sublimations. If this opinion were just, the corrosive would become mild, without any addition, barely by repeating the sublimation; but this is contrary to all experience. The abatement of the corrosive quality of the sublimate is entirely owing to the combination of as much fresh mercury as is capable of being united with it; and by whatever means this combination be effected, the preparation will be sufficiently dulcified. Triture and digestion promote the union of the two, while sublimation tends rather to disunite them. The prudent operator, therefore, will not be solicitous about separating such mercurial globules as appear distinct after the first sublimation: he will endeavour rather to combine them with the rest, by repeating the triture and digestion.

The college of Wirtemberg require their sweet mercury to be only twice sublimed, and the Augustan but once; and Neumann proposes making it directly by a single sublimation from the ingredients of the corrosive sublimate, by only taking the quicksilver in a larger proportion.

Mr Selle of Berlin has lately proposed a method of making sweet mercury nearly similar to that of Neumann. He directs, that to four ounces of pure quicksilver there should be added as much strong vitriolic acid. These are to be mixed over a strong fire till they become a solid hard mass. This mass is to be tritured in a stone mortar with two ounces and an half of quicksilver and four ounces and an half of dried common salt. And by a single, or at most two, sublimations, he assures us an excellent sweet mercury is obtained.

If the medicine made after either of these methods should prove in any degree acrid, water boiled on it for some time will dissolve and separate that part in which its acrimony consists. The marks of the preparation being sufficiently dulcified are, its being perfectly insipid to the taste, and indissoluble by long boiling in water. Whether the water in which it has been boiled has taken up any part of it, may be known by dropping into the liquor a ley of any fixed alkaline

salt, or any volatile alkaline spirit. If the decoction has any mercurial impregnation, it will grow turbid on this addition; if otherwise, it will continue limpid. But here care must be taken not to be deceived by any extraneous saline matter in the water itself. Most of the common spring waters turn milky on the addition of alkalis; and therefore, for experiments of this kind, distilled water or rain water ought to be used.

This name of *calomel*, though for a considerable time banished from our best pharmacopœias, is again restored by the London college. But we cannot help thinking, that they might easily have invented a name better expressing the constituent parts and nature of the preparation.

Calomel, or sweet mercury, may be considered as one of the most useful of the mercurial preparations; and it may be estimated as holding an intermediate place between the acetated quicksilver, one of the mildest of the saline preparations, and the muriated quicksilver, or corrosive sublimate, one of the most acrid of them.

Mild muriated quicksilver. L.

Take purified quicksilver, diluted nitrous acid, of each half a pound. Mix in a glass vessel, and set it aside until the quicksilver be dissolved. Let them boil, that the salt may be dissolved. Pour out the boiling liquor into a glass vessel into which another boiling liquor has been put before, consisting of sea-salt, four ounces; distilled water, eight pints. After a white powder has subsided to the bottom of the vessel, let the liquor swimming at the top be poured off, and the remaining powder be washed till it becomes insipid, with frequent affusions of hot water; then dried on blotting paper with a gentle heat.

This preparation had a place in former editions of the London and Edinburgh pharmacopœias under the name of *mercurius dulcis precipitatus*. But the process as now given is somewhat altered, being that of Mr Scheele of Sweden, who has recommended this as an easy and expeditious method of preparing sweet mercury or calomel.

It appears from several tests that this precipitate is equal in every respect to that prepared by the preceding processes. It is less troublesome and expensive, and the operator is not exposed to the noxious dust arising from the triture of the quicksilver with the corrosive sublimate, which necessarily happens by the common method. The powder is also finer than can be made from the common sublimed sweet mercury by any trituration whatever. The clear liquor standing over the precipitate is a solution of cubic or rhomboidal nitre.

Sweet mercury, which may be considered as precisely the same with the calomel and mild muriated quicksilver, appears to be one of the best and safest preparations of this mineral, when intended to act as a quick and general stimulant. Many of the more elaborate processes are no other than attempts to produce from mercury such a medicine as this really is. The dose, recommended by some for raising a salivation, is ten or fifteen grains taken in the form of a bolus or pill, every night or oftener, till the ptyalism begins. As an alterant and diaphoretic, it has been given in doses of five or six grains; a purgative being occasionally

sionally interposed, to prevent its affecting the mouth. It answers, however, much better when given in smaller quantities, as one, two, or three grains every morning and evening, in conjunction with such substances as determine its action to the skin, as the extract or resin of guaiacum; the patient at the same time keeping warm, and drinking liberally of warm diluent liquors. By this method of managing it, obstinate cutaneous and venereal distempers have been successfully cured without any remarkable increase of the sensible evacuations. It is sometimes, however, difficult to measure its effects in this way; and it is so very apt to run off by the intestines, that we can seldom administer it in such a manner as to produce those permanent effects which are often required, and which we are able to do by other preparations. It has been lately proposed to rub the gums and inside of the mouth with this preparation, as a ready and effectual method of producing salivation. This practice has been particularly recommended in the internal hydrocephalus, where it is exceedingly difficult to excite a salivation by other means. The advantages of this practice are not fully confirmed by experience; and when mercury is attended with advantage in hydrocephalus, this is not probably the consequence of any discharge under the form of salivation, but merely of the mercury being introduced into the system in an active state, and thus promoting absorption. And salivation, when it arises from the internal use of mercury, may be considered as the strongest test of this; but this is by no means the case when salivation arises from a topical action on the excretories of saliva.

Red nitrated quicksilver. L.

295 Take of purified quicksilver, nitrous acid, each one pound; muriatic acid, one dram. Mix in a glass vessel, and dissolve the quicksilver in a sand bath; then raise the fire until the matter be formed into red crystals.

Red corrosive, commonly called red precipitated mercury. E.

296 Take of quicksilver, weak nitrous acid, each one pound. Let the quicksilver be dissolved in the acid, and then let the solution be evaporated to a white dry mass. This being beat into a powder, must be put into a glass retort, and subjected to a fire gradually increased, till a small quantity of it, taken out in a glass spoon, and allowed to cool, assumes the form of shining red squamæ. Let the vessel be then removed from the fire. During the process the matter must be carefully agitated by a glass rod, that it may be equally heated.

The marine acid, in the menstruum ordered in the first process, disposes the mercurial calx to assume the bright sparkling look admired in it; which, though perhaps no advantage to it as a medicine, ought nevertheless to be insisted on by the buyer as a mark of its goodness and strength. As soon as the matter has gained this appearance, it should be immediately removed from the fire, otherwise it will soon lose it again. The preparation of this red precipitate, as it is called, in perfection, is supposed by some to be a secret not known to our chemists, inasmuch that we are under the necessity of importing it from abroad. This reflection seems to be founded on misinformation.

We sometimes indeed receive considerable quantities of it from Holland; but this depends on the ingredients being commonly cheaper there than with us, and not on any secret in the manner of the preparation.

This precipitate is, as its title imports, an escharotic; and with this intention is frequently employed by the surgeons with basilicum and other dressings, for consuming fungous flesh in ulcers and the like purposes. It is subject to great uncertainty in point of strength, more or less of the acid exhaling according to the degree and continuance of the fire. The best criterion of its strength, as already observed, is its brilliant appearance; which is also the mark of its genuineness: if mixed with minium, which it is sometimes said to be, the duller hue will discover the abuse. This admixture may be more certainly detected by means of fire: the mercurial part will totally evaporate, leaving the minium behind.

Some have ventured to give this medicine internally in venereal, scrophulous, and other obstinate chronic disorders, in doses of two or three grains or more. But certainly the milder mercurials, properly managed, are capable of answering all that can be expected from this; without occasioning violent anxieties, tormina of the bowels, and similar ill consequences, which the best management can scarcely prevent this corrosive preparation from sometimes inducing. The chemists have contrived sundry methods of correcting and rendering it milder, by divesting it of a portion of the acid; but to no very good purpose, as they either leave the medicine still too corrosive, or render it similar to others which are procurable at an easier rate.

White calx of quicksilver. L.

297 Take of muriated quicksilver, sal ammoniac, water of kali, each half a pound. Dissolve first the sal ammoniac, afterwards the muriatic quicksilver, in distilled water, and add the water of kali. Wash the precipitated powder until it becomes insipid.

White precipitate of mercury. E.

298 Dissolve corrosive sublimate mercury in a sufficient quantity of hot water, and gradually drop into the solution some spirit of sal ammoniac as long as any precipitation ensues. Wash the precipitated powder with several fresh quantities of warm water.

These preparations are used chiefly in ointments, with which intention their fine white colour is no small recommendation to them. For internal purposes they are rarely employed, nor is it at all wanted: they are nearly similar to sweet mercury, but less certain in their effects.

Though the processes directed by the London and Edinburgh colleges be here somewhat different, yet the preparations are ultimately the same. The process described by the Edinburgh college is the most simple; but is liable to some objections.

Corrosive sublimate, as we have already seen, consists of mercury united with a large portion of acid. It is there dulcified by adding as much fresh mercury as is sufficient to saturate all the acid; here, by separating all the acid that is not saturated. This last way seems an unfrugal one, on account not only of the loss of the acid, but of the volatile spirit necessary for absorbing it. The operator may, however, if it should be thought

thought worth while, recover the volatile salt from the liquor, by adding to it, after the precipitate has been separated, a proper quantity of potash, and distilling with a gentle heat, in the same manner as for the spirit or volatile salt of sal ammoniac; for a true sal ammoniac is regenerated, in the precipitation, from the union of the volatile spirit with the marine acid of the sublimate. It is by no means advisable to use the liquor itself as a solution of sal ammoniac, or to separate the sal ammoniac from it by evaporation and crystallization, as a part of the mercury might be retained, and communicate dangerous qualities: but the volatile salt separated by distillation may be used without fear of its containing any mercury; none of which will arise with the heat by which the volatile salts are distilled.

Fixed alkalis answer as effectually for precipitating solutions of sublimate as the volatile; but the precipitate obtained by means of the former, instead of being white, as with the latter, is generally of a reddish yellow or orange colour. If sal ammoniac be dissolved along with the sublimate, the addition of fixed alkalis will, by extricating the volatile alkali of the sal ammoniac, occasion as white a precipitation as if the volatile salt had been previously separated and employed in its pure state; and this compendium is now allowed by the London college in the process which they have adopted.

There the sal ammoniac, besides its use in the capital intention, to make a white precipitation, promotes the solution of the sublimate; which of itself is difficultly, and scarcely at all totally, soluble by repeated boiling in water: for however skilfully it be prepared, some part of it will have an under-proportion of acid, and consequently approach to the state of sweet mercury. A good deal of care is requisite in the precipitation; for if too large a quantity of the fixed alkaline solution be imprudently added, the precipitate will lose the elegant white colour for which it is valued.

Quicksilver with sulphur. L.

- 299 Take of purified quicksilver, flowers of sulphur, each one pound. Rub them together until the globules disappear.

Æthiops mineral. E.

- 300 Take of quicksilver, flowers of sulphur, each equal weights. Grind them together in a glass or stone mortar, with a glass pestle, till the mercurial globules totally disappear.

An æthiops is made also with a double quantity of mercury.

We need hardly remark, that these preparations, though now differing in name, are in reality the same. Nor need we add, that the direction given by the Edinburgh college, of using a glass or stone mortar and pestle, is necessary and proper.

The union of the mercury and sulphur might be much facilitated by the assistance of a little warmth. Some are accustomed to make this preparation in a very expeditious manner, by melting the sulphur in an iron ladle, then adding the quicksilver, and stirring them together till the mixture be completed. The small degree of heat here sufficient cannot reasonably be supposed to do any injury to substances which have

already undergone much greater fires, not only in the extraction from their ores, but likewise in the purifications of them directed in the pharmacopœia. In the following process they are exposed in conjunction to a strong fire, without suspicion of the compound receiving any ill quality from it. This much is certain, that the ingredients are more perfectly united by heat than by the degree of triture usually bestowed on them. From the æthiops prepared by triture, part of the mercury is apt to be squeezed out on making it into an electuary or pills; from that made by fire no separation is observed to happen.

Æthiops mineral is one of the most inactive of the mercurial preparations. Some practitioners, however, have represented it as possessing extraordinary virtues; and most people imagine it a medicine of some efficacy. But what benefit is to be expected from it in the common doses of eight or ten grains, or a scruple, may be judged from hence, that it has been taken in doses of several drams, and continued for a considerable time, without producing any remarkable effect. Sulphur eminently abates the power of all the more active minerals, and seems to be at the same time restrained by them from operating in the body itself. Boerhaave, who is in general sufficiently liberal in the commendation of medicines, disapproves of the æthiops in very strong terms. "It cannot enter the absorbent vessels, the lacteals, or lymphatics, but passes directly through the intestinal tube, where it may happen to destroy worms, if it operates luckily. They are deceived who expect any other effects from it; at least I myself could never find them. I am afraid it is unwarily given, in such large quantities, to children and persons of tender constitutions, as being a foreign mass, unconquerable by the body; the more to be suspected as it there continues long sluggish and inactive. It does not raise a salivation, because it cannot come into the blood. Who knows the effects of a substance, which, so long as it remains compounded, seems no more active than any ponderous insipid earth?" The æthiops, with a double proportion of mercury, now received into our pharmacopœias, has a greater chance for operating as a mercurial; and probably the quantity of mercury might be still further increased to advantage.

Red sulphurated quicksilver. L.

Take of quicksilver, purified, forty ounces; sulphur, eight ounces. Mix the quicksilver with the melted sulphur; and if the mixture takes fire, extinguish it by covering the vessel; afterwards reduce the mass to powder, and sublime it.

It has been customary to order a larger quantity of sulphur than here directed; but smaller proportions answer better, for the less sulphur the finer coloured is the cinnabar.

As soon as the mercury and sulphur begin to unite, a considerable explosion frequently happens, and the mixture is very apt to take fire, especially if the process be somewhat hastily conducted. This accident the operator will have previous notice of, from the matter swelling up, and growing suddenly consistent: as soon as this happens, the vessel must be immediately close covered.

During the sublimation, care must be had that the matter

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matter rise not into the neck of the vessel, so as to block up and burst the glass. To prevent this, a wide-necked bolt head, or rather an oval earthen jar, coated, should be chosen for the subliming vessel. If the former be employed, it will be convenient to introduce at times an iron wire, somewhat heated, in order to be the better assured that the passage is not blocking up; the danger of which may be prevented by cautiously raising the vessel higher from the fire.

If the ingredients were pure, no feces will remain: in such cases, the sublimation may be known to be over by introducing a wire as before, and feeling there-with the bottom of the vessel, which will then be perfectly smooth: if any roughness or inequalities are perceived, either the mixture was impure, or the sublimation is not completed: if the latter be the case, the wire will soon be covered over with the rising cinnabar.

The preparers of cinnabar in large quantity employ earthen jars, which in shape pretty much resemble an egg. These are of different sizes, according to the quantity intended to be made at one sublimation, which sometimes amounts to two hundred weight. The jar is usually coated from the small end almost to the middle, to prevent its breaking by the vehemence or irregularity of the fire. The greater part, which is placed uppermost, not being received within the furnace, has no occasion for this defence. The whole secret with regard to this process, is the management of the fire, which should be so strong as to keep the matter continually subliming to the upper part of the jar, without coming out at its mouth, which is covered with an iron plate; care should also be taken to put into the subliming vessel only small quantities of the mixture at a time.

The principal use of cinnabar is as a pigment. It was formerly held in great esteem as a medicine in cutaneous foulnesses, gouty and rheumatic pains, epileptic cases, &c. but of late it has lost much of its reputation. It appears to be nearly similar to the æthiops already spoken of. Cartheuser relates, that having given cinnabar in large quantities to a dog, it produced no sensible effect, but was partly voided along with the feces unaltered, and partly found entire in the stomach and intestines on opening the animal. The celebrated Frederic Hoffman, after bestowing high encomiums on this preparation, as having in many instances within his own knowledge perfectly cured epilepsies and vertiges from contusions of the head (where it is probable, however, that the cure did not so much depend on the cinnabar as on the spontaneous recovery of the parts from the external injury), observes, that the large repeated doses, necessary for having any effect, can be borne only where the first passages are strong; and that if the fibres of the stomach and intestines are lax and flaccid, the cinnabar, accumulated and concreting with the mucous matter of the parts, occasions great oppression; which seems to be an acknowledgment that the cinnabar is not subdued by the powers of digestion, and has no proper medicinal activity. There are indeed some instances of the daily use of cinnabar having brought on a salivation; perhaps from the cinnabar, used in those cases, having contained a less proportion of sulphur than the sorts commonly met with. The regulus of antimony, and even white ar-

senic, when combined with a certain quantity of common sulphur, seem to have their deleterious power destroyed: on separating more and more of the sulphur, they exert more and more of their proper virulence. It does not seem unreasonable to presume, that mercury may have its activity varied in the same manner; that when perfectly satiated with sulphur, it may be inert; and that when the quantity of sulphur is more and more lessened, the compound may have greater and greater degrees of the proper efficacy of mercurials.

Cinnabar is sometimes used in fumigations against venereal ulcers in the nose, mouth, and throat. Half a dram of it burnt, the fume being imbibed with the breath, has occasioned a violent salivation. This effect is by no means owing to the medicine as cinnabar: when set on fire, it is no longer a mixture of mercury and sulphur, but mercury resolved into fume, and blended in part with the volatile vitriolic acids; in either of which circumstances this mineral, as we have already observed, has very powerful effects.

Vitriolated quicksilver. L.

Take of quicksilver, purified, vitriolic acid, each one pound. Mix in a glass vessel, and heat them by degrees until they unite into a white mass, which is to be perfectly dried with a strong fire. This matter, on the affusion of a large quantity of hot distilled water, immediately becomes yellow, and falls to powder. Rub the powder carefully with this water in a glass mortar. After the powder has subsided, pour off the water; and, adding more distilled water several times, wash the matter till it become insipid.

Yellow mercury, commonly called Turbith mineral. E.

Take of quicksilver, four ounces; vitriolic acid, eight ounces. Cautiously mix them together, and distil in a retort, placed in a sand furnace, to dryness: the white calx, which is left at the bottom, being ground to powder, must be thrown into warm water. It immediately assumes a yellow colour, but must afterwards be purified by repeated ablutions.

The quantity of oil of vitriol, formerly directed, was double to that now employed by the Edinburgh college. The reduction made in this article greatly facilitates the process; and the proportions of the London college are perhaps preferable.

Boerhaave directs this preparation to be made in an open glass, slowly heated, and then placed immediately on burning coals; care being taken to avoid the fumes, which are extremely noxious. This method will succeed very well with a little address when the ingredients are in small quantity; but where the mixture is large, it is better to use a retort, placed in a sand-furnace, with a recipient, containing a small quantity of water, luted to it. Great care should be taken, when the oil of vitriol begins to bubble, that the heat be steadily kept up, without at all increasing it, till the ebullition ceases, when the fire should be augmented to the utmost degree, that as much as possible of the redundant acid may be expelled.

If the matter be but barely exsiccated, it proves a caustic salt, which in the ablation with water will almost all dissolve, leaving only a little quantity of turbith:

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bith: the more of the acid that has been dissipated, the less of the remaining mercury will dissolve, and consequently the yield of turbith will be greater; fire expelling only such part of the acid as is not completely satiated with mercury, while water takes up always, along with the acid, a proportional quantity of the mercury itself. Even when the matter has been strongly calcined, a part will still be soluble; this evidently appears on pouring into the washings a little solution of fixed alkaline salt, which will throw down a considerable quantity of yellow precipitate, greatly resembling the turbith, except that it is less violent in operation.

From this experiment it appears, that the best method of edulcorating this powder is, by impregnating the water, intended to be used in its ablution, with a determined proportion of fixed alkaline salt; for by this means, the washed turbith will not only turn out greater in quantity, but, what is of more consequence, will have an equal degree of strength; a circumstance which deserves particularly to be considered, especially in making such preparations as, from an error in the process, may prove too violently corrosive to be used with any tolerable degree of safety. It is necessary to employ warm water if we are anxious for a fine colour. If cold water be used, the precipitate will be white.

It is observable, that though the superfluous acid be here absorbed from the mercury by the alkaline salt; yet in some circumstances this acid forsakes that salt to unite with mercury. If vitriolated tartar, or *vitriolated kali*, as it is now called, which is a combination of vitriolic acid with fixed alkali, be dissolved in water, and the solution added to a solution of mercury in aquafortis, the vitriolic acid will unite with the mercury, and form with it a turbith, which falls to the bottom; leaving only the alkali dissolved in the aquafortis, and united with its acid into a regenerated nitre. On this principle depends the preparation described by Wilson under the title of *an excellent precipitate of mercury*; which is no other than a true turbith, though not generally known to be such. It is made by dissolving four ounces of vitriolated kali in sixteen ounces of spirit of nitre; dissolving in this compound liquor four ounces of mercury; abstracting the menstruum by a sand heat; and edulcorating with water the gold-coloured mass which remains.

Turbith mineral is a strong emetic, and with this intention operates the most powerfully of all the mercurials that can be safely given internally. Its action, however, is not confined to the primæ viæ; it will sometimes excite a salivation, if a purgative be not taken soon after it. This medicine is used chiefly in virulent gonorrhœas, and other venereal cases, where there is a great flux of humours to the parts. Its chief use at present is in swellings of the testicle from a venereal affection; and it seems not only to act as a mercurial, but also, by the severe vomiting it occasions, to perform the office of a discutient, by accelerating the motion of the blood in the parts affected. It is said likewise to have been employed with success, in robust constitutions, against leprous disorders and obstinate glandular obstructions: the dose is from two grains to six or eight. It may be given in doses of a grain or two as an alterative and diaphoretic, in the same manner as the calcined mercury already spoken

of. Dr Hope has found that the turbith mineral is the most convenient eriline he has had occasion to employ.

This medicine was lately recommended as the most effectual preservative against the hydrophobia. It has been alleged: there are several examples of its preventing madness in dogs which had been bitten; and some of its performing a cure after the madness was begun: from six or seven grains to a scruple may be given every day, or every second day, for a little time, and repeated at the two or three succeeding fulls and changes of the moon. Some few trials have likewise been made on human subjects bitten by mad dogs; and in these also the turbith, used either as an emetic or alternative, seemed to have good effects.

The washings of turbith mineral are used by some externally for the cure of the itch and other cutaneous foulnesses. In some cases mercurial lotions may be proper, but they are always to be used with great caution: this is by no means an eligible one, as being extremely unequal in point of strength, more or less of the mercury being dissolved, as has been observed above, according to the degree of calcination. The pharmacopœia of Paris directs a mercurial wash free from this inconvenience, under the title of *Aqua mercurialis*, or *Mercurius liquidus*. It is composed of one ounce of mercury, dissolved in a sufficient quantity of spirit of nitre, and diluted with 30 ounces of distilled water. In want of distilled water, rain water may be used; but of spring waters there are very few which will mix with the mercurial solution without growing turbid and precipitating a part of the mercury.

Simple mercurial solution. Jos. Jac. Plenck.

Take of purest quicksilver, one dram; gum arabic, two drams. Beat them in a stone mortar, adding by little and little distilled water of fumitory till the mercury thoroughly disappear in the mucilage. Having beat and mixed them thoroughly, add by degrees, and at the same time rubbing the whole together, syrup of kermes, half an ounce, distilled water of fumitory, eight ounces.

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This mixture was much celebrated by its author as an effectual preparation of mercury, unattended with the inconvenience of producing a salivation; and he imagined that this depended on a peculiar affinity existing between mercury and mucilage. Hence such a conjunction, the gummy quicksilver, as it has been styled, has been the foundation of mixtures, pills, syrups, and several other formulæ, which it is unnecessary to dwell upon in this place.

By a long continued triture, mercury seems to undergo a degree of calcination; at least its globular appearance is not to be discerned by the best microscope; its colour is converted into that of a greyish powder; and from the inactive substance in its globular form, it is now become one of the most powerful preparations of this metallic body. The use of the gum seems to be nothing more than to afford the interposition of a viscid substance to keep the particles at a distance from each other, till the triture requisite to produce this change be performed. Dr Saunders has clearly proved, that no real solution takes place in this

this process, and that though a quantity of mercurial particles are still retained in the mixture after the globular parts have been deposited by dilution with water, yet that this suspended mercurial matter is only diffused in the liquor, and capable of being perfectly separated by filtration. That long triture is capable of effecting the above change on mercury, is fully evinced from the well known experiment of Dr Boerhaave, in producing a kind of calcined mercury by exposing quicksilver inclosed in a phial to the agitation produced by keeping the phial tied to a wind-mill for 14 years. By inclosing a pound of quicksilver in an iron box, with a quantity of iron nails and a small quantity of water, by the addition of which a greater degree of intestine motion is given to the particles of the mercury, and fixing the box to the wheel of a carriage, Dr Saunders obtained, during a journey of 400 miles, two ounces of a greyish powder, or calx of mercury.

On the above accounts we are not to ascribe the effects of Plenck's solution to an intimate division of the globules of mercury, nor to any affinity, nor elective attraction, between gum-arabic and mercury; which last Mr Plenck has very unphilosophically supposed. The same thing can be done by means of gum-tragacanth, by honey, and by sundry balsams. It is evidently owing to the conversion of the quicksilver to a calciform nature; but as this will be accomplished more or less completely according to the different circumstances during the triture, it is certainly preferable, instead of Plenck's solution, to diffuse in mucilage, or other viscid matters, a determinate quantity of the ash-coloured powder, or other calx of mercury.

It is proper to take notice, that there is in many instances a real advantage in employing mucilaginous matters along with mercurials, these being found to prevent diarrhoea and salivation to a remarkable degree. So far, then, Mr Plenck's solution is a good preparation of mercury, though his chemical rationale is perhaps erroneous. The distilled water and syrup are of no consequence to the preparation, either as facilitating the process, or for medicinal use.

It is always most expeditious to triturate the mercury with the gum in the state of mucilage. Dr Saunders found that the addition of honey was an excellent auxiliary; and the mucilage of gum-tragacanth seems better suited for this purpose than gum-arabic.

CHAP. XIV. Preparations of Lead.

LEAD readily melts in the fire, and calcines into a dusky powder; which, if the flame is reverberated on it, becomes at first yellow, then red, and at length melts in a vitreous mass. This metal dissolves easily in the nitrous acid, difficultly in the vitriolic, and in small quantity in the vegetable acids; it is also soluble in expressed oil, especially when calcined.

Lead and its calces, while undissolved, have no considerable effects as medicines. Dissolved in oils, they are supposed to be (when externally applied) anti-inflammatory and desiccative. Combined with vegetable acids, they are remarkably so; and, taken internally, prove a powerful though dangerous styptic.

There are two preparations of lead, *red* and *white* lead, as they are commonly called, which are much more extensively employed in other arts than in medicine, and of course they are prepared in large quantities. These formerly stood among the preparations in our pharmacopœias; but they are now referred to the materia medica. We shall not therefore, on the present occasion, make any farther observations with respect to them, but shall here insert from the old editions of the Edinburgh pharmacopœia the directions there given for preparing them.

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Red lead.

Let any quantity of lead be melted in an unglazed earthen vessel, and kept stirring with an iron spatula till it falls into powder, at first blackish, afterwards yellow, and at length of a deep red colour, in which last state it is called *minium*; taking care not to raise the fire so high as to run the calx into a vitreous mass.

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The preparation of red lead is so troublesome and tedious, as scarce ever to be attempted by the apothecary or chemist; nor indeed is this commodity expected to be made by them, the preparation of it being a distinct branch of business. The makers melt large quantities of lead at once, upon the bottom of a reverberatory furnace built for this purpose, and so contrived that the flame acts on a large surface of the metal, which is continually changed by means of iron rakes drawn backwards and forwards, till the fluidity of the lead is destroyed; after which, the calx is only now and then turned. By barely stirring the calx, as above directed, in a vessel over the fire, it acquires no redness; the reverberation of flame on the surface being absolutely necessary for this effect. It is said, that 20 pounds of lead gain, in this process, five pounds; and that the calx, being reduced into lead again, is found one pound less than the original weight of the metal.

These calces are employed in external applications, for abating inflammations, cleansing and healing ulcers, and the like. Their effects, however, are not very considerable; nor are they perhaps of much farther real use, than as they give consistence to the plaster, unguent, &c.

Ceruse or white lead.

Put some vinegar into the bottom of an earthen vessel, and suspend over the vinegar very thin plates of lead, in such a manner that the vapour which arises from the acid may circulate about the plates. Set the containing vessel in the heat of horse-dung for three weeks; if at the end of this time the plates be not totally calcined, scrape off the white powder, and expose them again to the steam of vinegar, till all the lead be thus corroded into powder.

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The making of white lead is also become a trade by itself, and confined to a few persons, who have large conveniences for this purpose. The general method which they follow is nearly the same with that above described. See the Philosophical Transactions, n° 137.

In this preparation, the lead is so far opened by the acid, as to discover, when taken internally, the

malignant quality of the metal; and to prove externally, when sprinkled on running sores, or ulcers, moderately cooling, drying, and astringent.

Acetate of ceruse. L.

- 368 Take of ceruse, one pound; distilled vinegar, one gallon and an half. Boil the ceruse with the vinegar until the vinegar is saturated: then filter thro' paper; and, after proper evaporation, let it aside to crystallize.

Salt, commonly called sugar of lead. E.

- 369 Put any quantity of ceruse into a cucurbit, and pour upon it ten times its quantity of distilled vinegar. Let the mixture stand upon warm sand till the vinegar becomes sweet: when it is to be poured off, and fresh vinegar added as often as it comes off sweet. Then let all the vinegar be evaporated in a glass-vessel to the consistence of pretty thin honey, and set it aside in a cold place, that crystals may be formed, which are to be afterwards dried in the shade. The remaining liquor is again to be evaporated, that new crystals may be formed; the evaporation of the residuous liquor is to be repeated till no more crystals concreate.

Ceruse (especially that sort called *flake lead*, which is not, like the others, subject to adulteration) is much preferable either to minium or litharge, for making the sugar of lead: for the corrosion which it has undergone from the steam of the vinegar disposes it to dissolve more readily. It should be finely powdered before the vinegar be put to it; and during the digestion, or boiling, every now and then stirred up with a wooden spatula, to promote its dissolution, and prevent its concreting into a hard mass at the bottom. The strong acid obtained from the *caput mortuum* of vinegar may be employed for this purpose to better advantage than the weaker, though purer acid, above directed. If a small quantity of rectified spirit of wine be prudently added to the solution as soon as it is duly exhaled, and the mixture suffered to grow cold by slow degrees, the sugar will concreate into very large and transparent crystals, which are scarcely to be obtained by any other method.

If the crystals be dried in sunshine, they acquire a blackish or livid colour. This seems to happen from the absorption of light and its conversion into phlogiston. If it be owing to the escape of pure air, why are the rays of the sun necessary to this discharge? On whatever principles we account for it, the fact is the same; that the crystals soon lose their saline condition, and the lead gradually reassumes its metallic form. From this property of lead readily absorbing phlogiston, or parting with pure air, a solution of the sugar of lead becomes a very convenient sympathetic ink; on the same grounds it is also used for a more important purpose. As lead communicates a sweetness and astringency very similar to the product of the vinous fermentation, a practice formerly prevailed among fraudulent dealers, of correcting the too great sharpness of acid wines by adulterating them with this metal. The abuse may be detected in two different ways: a piece of paper may be moistened with the liquor to be examined, and then exposed to

the vapours of liver of sulphur: the moistened paper will become of a livid colour, and this will happen though 200 or 300 leaves of a book were interposed between the paper and the vapours; by this method, then, we make a kind of sympathetic ink. But the best way of making the test is, to drop a small quantity of a solution of the liver of sulphur into the suspected liquor: if there be any lead present, this addition will instantly occasion the precipitation of a livid or dark coloured cloud.

The sugar of lead is much more efficacious than the foregoing preparations, in answering the several intentions to which they are applied. Some have ventured upon it internally, in doses of a few grains, as a styptic in hæmorrhagies, profuse colliquative sweats, seminal fluxes, the fluxus albus, &c. nor has it failed their expectations. It very powerfully restrains the discharge; but almost as certainly as it does this, it occasions symptoms of another kind, often more dangerous than those removed by it, and sometimes fatal. Violent pains in the bowels or through the whole body, and obstinate constipations, sometimes immediately follow, especially if the dose has been considerable: cramps, tremors, and weakness of the nerves, generally sooner or later ensue.

Boerhaave is of opinion, that this preparation proves malignant only as far as its acid happens to be absorbed in the body; for in such case, he says, "it returns again into ceruse, which is violently poisonous." On this principle it would follow, that in habits where acidities abound, the sugar of lead would be innocent. But this is far from being the case. Lead and its preparations act in the body only when they are combined with acid: ceruse possesses the qualities of the saccharum only in a low degree; and either of them freed from the acid has little, if any, effect at all. For the same reasons, the salt of lead is preferable to the pompous extract and *vegeto-mineral water* of Goulard, in which the lead is much less perfectly combined in a saline state. It is sometimes convenient to assist the solution of the sugar of lead in water, by adding a portion of vinegar. The effects of the external application of lead seems to differ from the strength of the solution: thus a very weak solution seems to diminish directly the action of the vessels, and is therefore more peculiarly proper in active inflammations, as of the eyes; whereas a strong solution operates as a direct stimulant, and is therefore more successful in passive ophthalmia.

Water of acetated litharge. L.

- Take of litharge, two pounds and four ounces; distilled vinegar, one gallon. Mix, and boil to six pints, constantly stirring; then set it aside. After the feces have subsided, strain. 310

This preparation may be considered as nearly the same with the extract and *vegeto-mineral water* of Mr Goulard. And it is probably from the circumstances of his preparations having come into a common use, that the London college have given this article a place in their pharmacopœia. It may, however, be a matter of doubt whether it be really intitled to a place. For, as we have already observed, every purpose to be answered by it may be better obtained from the employment

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ployment of a solution of the acetated ceruse in simple water. The acetated water of litharge is intended for external use only.

CHAP. XV. *Preparations of tin.*Prepara-
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311 Tin easily melts in the fire, and calines into a dusky powder; which, by a farther continuance of the heat, becomes white. A mass of tin heated till it be just ready to melt, proves extremely brittle, so as to fall in pieces from a blow; and by dexterous agitation, into powder. Its proper menstruum is aqua-regia; though the other mineral acids may also be made to dissolve it, and the vegetable ones in small quantity. It crystallizes with the vegetable and vitriolic acids; but with the others, deliquesces.

The virtues of this metal are little known. It has been recommended as an antihysterical, antiseptic, &c. At present it is chiefly used as an anthelmintic.

Powdered tin. L.

312 Take of tin, six pounds. Melt it in an iron vessel, and stir it with an iron rod until a powder floats on the surface. Take off the powder, and, when cold, pass it through a sieve.

This preparation may be considered as nearly the same with the calx Jovis, which had a place in the former editions of the Edinburgh pharmacopœia; but from the late editions the calx has been expunged, and the filings or powder of tin, has a place only in their list of the materia medica. But although seldom prepared by the apothecary himself, it is not unfrequently employed as a remedy against worms, particularly the flat kinds, which too often elude the force of other medicines. The general dose is from a scruple to a dram; some confine it to a few grains. But Dr Alston assures us, in the Edinburgh Essays, that its success chiefly depends on its being given in much larger quantities: he directs an ounce of the powder on an empty stomach, mixed with four ounces of molasses; next day, half an ounce; and the day following, half an ounce more; after which a cathartic is administered: he says the worms are usually voided during the operation of the purge, but that pains in the stomach occasioned by them are removed almost immediately upon taking the first dose of the tin.

This practice is sometimes successful in the expulsion of tœnia, but by no means so frequently as Dr Alston's observations would lead us to hope.

Amalgama of tin. Dan.

313 Take of shavings of pure tin, two ounces; pure quicksilver, three drams. Let them be rubbed to a powder in a stone mortar.

Some have imagined that tin thus acted on by mercury is in a more active condition than when exhibited in a state of powder: and accordingly it has been given in worm cases. But as both are equally insoluble in the animal fluids, this is not to be expected; and to obtain any peculiar properties which tin may possess to their full extent, it will probably be necessary to exhibit it in some saline state.

CHAP. XVI. *Preparations of zinc and copper.**Calined zinc. L.*

TAKE of zinc, broken into small pieces, eight ounces. Cast the pieces of zinc, at several times, into an ignited, large, and deep crucible, placed leaning, or half-upright, putting on it another crucible in such a manner that the air may have free access to the burning zinc. Take out the calx as soon as it appears, and separate its white and lighter part by a fine sieve.

Flowers of zinc. E.

Let a large crucible be placed in a furnace, in an inclined situation, only half-upright; when the bottom of the vessel is moderately red, put a small piece of zinc, about the weight of two drams, into it. The zinc soon flames, and is at the same time converted into a spongy calx, which is to be raked from the surface of the metal with an iron spatula, that the combustion may proceed the more speedily: when the zinc ceases to flame, take the calx out of the crucible. Having put in another piece of zinc, the operation may be repeated as often as you please. Lastly, the calx is to be prepared like antimony.

These flowers, as used externally, are preferable for medicinal purposes to tutty, and the more impure sublimes of zinc, which are obtained in the brass works; and likewise to calamine, the natural ore of this metal, which contains a large quantity of earth, and frequently a portion of heterogeneous metallic matter. But besides being applied externally, they have also of late been used internally. The flowers of zinc, in doses from one to seven or eight grains, have been much celebrated of late years in the cure of epilepsy and several spasmodic affections: and there are sufficient testimonies of their good effects, where tonic remedies in those affections are proper.

White vitriol. E.

Take of zinc, cut into small pieces, three ounces; vitriolic acid, five ounces; water, twenty ounces; having mixed the acid and water, add the zinc, and when the ebullition is finished strain the liquor; then after proper evaporation set it apart in a cold place, that it may shoot into crystals.

This salt is an elegant white vitriol. It differs from the common white vitriol, and the salt of vitriol of the shops, only in being purer, and perfectly free from any admixture of copper, or such other foreign metallic bodies as the others generally contain.

Purified vitriolated zinc. L.

Take of white vitriol, one pound; vitriolic acid, one dram; boiling distilled water, three pints. Mix, and filter through paper. After a proper evaporation, set it aside in a cold place to crystallize.

Although the Edinburgh college have given a formula for the preparations of white vitriol, yet their direction is very rarely followed by any of the apothecaries or chemists, who in general purchase it as obtained from the Goslar mines. When, however, it is got in this way, it is often a very impure salt, and requires

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quires that purification which is here directed, and which is by no means necessary for the white vitriol artificially prepared, in the manner above directed. But by this process, the ordinary white vitriol, in its common state of impurity, will be freed from those impregnation of earthy and other matters which it often contains. And in this purified state it answers many useful purposes, not only externally but internally; and particularly in doses from ten grains to half a dram, it operates almost instantly as an emetic, and is at the same time perfectly safe. By employing it internally, in smaller doses, we may obtain, and perhaps even more effectually, all the tonic power of the zinc; and some think it in every case preferable to the calx of zinc.

Ammoniacal copper. E.

318 Take of blue vitriol, two parts; volatile sal ammoniac, one part; rub them together in a glass mortar, and then enter the effervescence ceases, into a shallow vessel of lead, which must be first lined on the inside with paper, and afterwards by a gentle heat. The product must be kept in a glass phial well closed with a glass stopper.

This preparation has been thought serviceable in epilepsies; but from its frequent want of success, and the disagreeable consequences with which its use is sometimes attended, it has not lately been much preferred. It is employed by beginning with doses of half a grain, twice a day, and increasing them gradually to as much as the stomach will bear. Dr Cullen sometimes increased the dose to five grains.

CHAP. XVII. Simple distilled waters. L. E.

319

THE effluvia which exhale into the air from many vegetables, particularly from those of the odorous kind, consist apparently of principles of great subtilty and activity, capable of strongly and suddenly affecting the brain and nervous system, especially in those whose nerves are of great sensibility; and likewise of operating in a slower manner on the system of the grosser vessels. Thus Boerhaave observes, that in hysterical and hypochondriacal persons, the fragrant odour of the Indian hyacinth excites spasms, which the strong scent of rue relieves; that the effluvia of the walnut-tree occasion headaches, and make the body costive; that those of poppies procure sleep; and that the smell of bean-blossoms, long continued, disorders the senses. Lemery relates, from his own knowledge, that several persons were purged by staying long in a room where damask roses were drying.

Some of the chemists have indulged themselves in the pleasing survey of these presiding spirits, as they are called, of vegetables; their peculiar nature in the different species of plants; their exhalation into the atmosphere by the sun's heat, and dispersion by winds; their rendering the air of particular places medicinal, or otherwise, according to the nature of the plants that abound. They have contrived also different means for collecting these fugitive emanations, and concentrating and condensing them into a liquid form; employing either the native moisture of the subject, or an addition of water, as a vehicle or matrix for retaining them.

The process which has been judged most analogous to that of nature, is the following. The subject freshly gathered at the season of its greatest vigour, with the morning dew on it, is laid lightly and unbruised in a shallow vessel, to which is adapted a low head with a recipient; under the vessel a live coal is placed, and occasionally renewed, so as to keep up an uniform heat, no greater than that which obtains in the atmosphere in summer, viz. about 85 degrees of Fahrenheit's thermometer. In this degree of heat there arises exceeding slowly an invisible vapour, which condenses in the head into dewy drops, and falls down into the receiver; and which has been supposed to be the very substance that the plant would have spontaneously emitted in the open air.

But on submitting many kinds of odoriferous vegetables to this process, the liquors obtained by it have been found to be very different from the natural effluvia of the respective subjects: they have had very little smell, and no remarkable taste. It appeared that a heat, equal to that of the atmosphere, is incapable of raising in close vessels those parts of vegetables which they emit in the open air. It may therefore be presumed, that in this last case some other cause concurs to the effect: that it is not the sun's heat alone which raises and impregnates the air with the odorous principles of vegetables, but that the air itself, or the watery humidity with which it abounds, acting as a true solvent, extracts and imbibes them; so that the natural effluvia of a plant may be considered as an infusion of the plant made in air. The purgative virtue of the damask rose, and the astringency of the walnut-tree, which, as above observed, are in some degree communicated to the air, may be totally extracted by infusion both in watery and spirituous menstrua, but never rise in distillation with any degree of heat: and the volatile odours of aromatic herbs, which are diffused through the atmosphere in the lowest warmth, cannot be made to distil without a heat much greater than is ever found to obtain in a shaded air.

We apprehend, that the effluvia arising from growing vegetables are chiefly exhaled by the living energy of the plant: the odorous matter is a real secretion, which cannot be performed independent of active vessels; and it is as reasonable to allow the same powers for the exhalation of these effluvia, as for the transpiration of their watery parts.

The above process, therefore, and the theory on which it is built, appear to be faulty in two points; 1. In supposing that all these principles, which naturally exhale from vegetables, may be collected by distillation; whereas there are many which the air extracts in virtue of its solvent power; some are also incapable of being collected in a visible and inelastic form; and some are artificially separable by solvents only: 2. In employing a degree of heat insufficient for separating even those parts which are truly exhalable by heat.

The foregoing method of distillation is commonly called *distillation by the cold still*; but those who have practised it have generally employed a considerable heat. A shallow leaden vessel is filled with the fresh herbs, flowers, &c. which are heaped above it; so that when the head is fitted on, this also may be filled a considerable way. A little fire is made under the vessel,

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fel, sufficient to make the bottom much hotter than the hand can bear, care being only taken not to heat it so far as to endanger scorching any part of the subject. If the bottom of the vessel be not made so hot as to have this effect on the part contiguous to it, it is not to be feared that the heat communicated to the rest of the included matter will be so great as to do it any injury. By this management, the volatile parts of several odorous plants, as mint, are effectually forced over; and if the process has been skilfully managed, the distilled liquor proves richly impregnated with the native odour and flavour of the subject, without having received any kind of disagreeable impression from the heat used.

This process has been chiefly practised in private families; the slowness of the distillation, and the attendance and care necessary for preventing the scorching of some part of the plant, so as to communicate an ungrateful burnt flavour to the liquor, rendering it inconsistent with the dispatch requisite in the larger way of business.

Another method has therefore been had recourse to, viz. by the common still, called, in distinction from the foregoing, the *hot still*. Here a quantity of water is added to the plant to prevent its burning; and the liquor is kept nearly of a boiling heat, or made to boil fully, so that the vapour rises plentifully into the head, and passing thence into a spiral pipe or worm placed in a vessel of cold water, is there condensed, and runs out in drops quickly succeeding each other, or in a continued stream. The additional water does not at all weaken the produce; for the most volatile parts of the subject rise first, and impregnate the liquor that first distils: as soon as the plant has given over its virtue sufficiently, which is known by examining from time to time the liquor that runs from the nose of the worm, the distillation is to be stopped.

This is the method of distillation commonly practised for the official waters. It is accompanied with one imperfection, affecting chiefly those waters whose principal value consists in the delicacy of their flavour; this being not a little injured by the boiling heat usually employed, and by the agitation of the odorous particles of the subject with the water. Sometimes also a part of the plant sticks to the sides of the still, and is so far scorched as to give an ungrateful taint to the liquor.

There is another method of managing this operation, which has been recommended for the distillation of the more volatile essential oils, and which is equally applicable to that of the waters. In this way, the advantages of the foregoing methods are united, and their inconveniences obviated. A quantity of water being poured into the still, and the herbs or flowers placed in a basket over it, there can be no possibility of burning; the water may be made to boil, but so as not to rise up into the basket, which would defeat the intention of this contrivance. The hot vapour of the water passing lightly through all the interstices of the subject matter, imbibes and carries over the volatile parts unaltered in their native flavour. By this means the distilled waters of all those substances whose oils are of the most volatile kind, are obtained in the utmost perfection, and with sufficient dispatch; for which

last intention the still may be filled quite up to the head.

In the distillation of essential oils, the water, as was observed in the foregoing section, imbibes always a part of the oil. The distilled liquors here treated of, are no other than water thus impregnated with the essential oil of the subject; whatever smell, taste, or virtue is here communicated to the water, or obtained in the form of a watery liquor, being found in a concentrated state in the oil. The essential oil, or some part of it, more attenuated and subtilized than the rest, is the direct principle on which the title of *spiritus rectior*, or presiding spirit, has been bestowed.

All those vegetables therefore which contain an essential oil, will give over some virtue to water by distillation: but the degree of the impregnation of the water which a plant is capable of saturating with its virtue, are by no means in proportion to the quantity of its oil. The oil saturates only the water that comes over at the same time with it: if there be more oil than is sufficient for this saturation, the surplus separates, and concretes in its proper form, not miscible with the water that arises afterwards. Some odoriferous flowers, whose oil is in so small quantity, that scarcely any visible mark of it appears, unless fifty or an hundred pounds or more are distilled at once, give nevertheless as strong an impregnation to water as those plants which abound most with oil.

Many have been of opinion, that distilled waters may be more and more impregnated with the virtues of the subject, and their strength increased to any assigned degree, by *cobobation*, that is, by redistilling them a number of times from fresh parcels of the plant. Experience, however, shows the contrary; a water skilfully drawn in the first distillation, proves on every repeated one not stronger but more disagreeable. Aqueous liquors are not capable of imbibing above a certain quantity of the volatile oil of vegetables; and this they may be made to take up by one as well as by any number of distillations: the oftener the process is repeated, the ungrateful impression which they generally receive from the fire, even at the first time, becomes greater and greater. Those plants, which do not yield at first waters sufficiently strong, are not proper subjects for this process, since their virtue may be obtained much more advantageously by others.

General rules for the DISTILLATION of the OFFICIAL SIMPLE WATERS.

1. Where they are directed fresh, such only must be employed: but some are allowed to be used dry, as being easily procurable in this state at all times of the year, though rather more elegant waters might be obtained from them while green.

When fresh and juicy herbs are to be distilled, thrice their weight of water will be fully sufficient; but dry ones require a much larger quantity. In general, there should be so much water, that after all intended to be distilled has come over, there may be liquor enough left to prevent the matter from burning to the still.

Plants differ so much, according to the soil and season of which they are the produce, and likewise according to their own age, that it is impossible to fix the

the quantity of water to be drawn from a certain weight of them to any invariable standard. The distillation may always be continued as long as the liquor runs well flavoured off the subject, and no longer.

2. The distillation may be performed in an alembic with a refrigeratory, the junctures being luted
3. If the herbs are of prime goodness, they must be taken in the weights prescribed: but when fresh ones are substituted for dry, or when the plants themselves are the produce of unfavourable seasons, and weaker than ordinary, the quantities are to be varied according to the discretion of the artist.

After the odorous water, alone intended for use, has come over, an acidulous liquor arises, which has sometimes extracted so much from the copper head of the still as to prove emetic. To this are owing the anthelmintic virtues attributed to certain distilled waters.

4. In a preceding edition of the Edinburgh pharmacopœia, some vegetables were ordered to be slightly fermented with the addition of yest previously to the distillation.

The principle on which this management is founded, is certainly just; for the fermentation somewhat opens and unlocks their texture, so as to make them part with more in the subsequent distillation than could be drawn over from them without some assistance of this kind. Those plants, however, which require this treatment, are not proper subjects for simple waters to be drawn from, their virtues being obtainable to better advantage by other processes.

5. If any drops of oil swim on the surface of the water, they are to be carefully taken off.
6. That the waters may keep the better, about a 20th part their weight of proof-spirit may be added to each after they are distilled.

A great number of distilled waters were formerly kept in the shops, and are still retained in foreign pharmacopœias. The faculty of Paris direct, in the last edition of their *Codex Medicamentarius*, no less than 125 different waters, and 130 different ingredients in one single water. Nearly one half of these preparations have scarcely any virtue or flavour from the subject, and many of the others are insignificant.

The colleges of London and Edinburgh have rejected these ostentatious superfluities, and given an elegant and compendious set of waters, sufficient for answering such purposes as these kinds of preparations are applied to in practice. Distilled waters are employed chiefly as grateful diluents, as suitable vehicles for medicines of greater efficacy, or for rendering disgusting ones more acceptable to the palate and stomach; few are depended on, with any intention of consequence, by themselves.

Distilled water. L.

321

Take of spring-water, 10 gallons. Draw off by distillation, first, four pints; which being thrown away, draw off four gallons. This water is to be kept in a glass or earthen bottle with a glass stopper.

Distilled water. E.

Let well or river water be distilled in very clean vessels till about two thirds are drawn off.

Native water is seldom or never found pure, and generally contains earthy, saline, metallic, or other matters. Distillation is therefore employed as a means of freeing it from these heterogeneous parts. For some pharmaceutical purposes distilled water is absolutely necessary: thus, if we employ hard undistilled water for dissolving sugar of lead, instead of a perfect solution, we produce a milky-like cloud, owing to a real decomposition of parts.

Distilled water is now employed by the London college for a great variety of purposes; and there can be no doubt, that in many chemical and pharmaceutical processes, the employment of a heterogeneous fluid, in place of the pure element, may produce an essential alteration of qualities, or frustrate the intention in view. While the London college have made more use of distilled water than any other, their directions for preparing it seem to be the best. For as some impregnations may be more volatile than pure water, the water may be freed from them by throwing away what comes first over; and by keeping it afterwards in a close vessel, absorption from the air is prevented.

Dill-water. L.

Take of dill-seed, bruised, one pound; water, sufficient to prevent an empyreuma. Draw off one gallon.

322

Simple dill-seed water. E.

Take of dill seeds, one pound; pour on as much water as when ten pounds have been drawn off by distillation there may remain as much as is sufficient to prevent an empyreuma. After proper maceration, let ten pounds be drawn off.

Although the dill water holds a place, not only in the London and Edinburgh pharmacopœias, but also in most of the foreign ones; yet it is not much employed in practice. It obtains, indeed, a pretty strong impregnation from the seeds, and is sometimes employed as a carminative, particularly as the basis of mixtures and juleps; but it is less powerful and less agreeable than that of pepper mint, cinnamon, and some others.

Cinnamon-water. L. E.

Take of cinnamon, bruised, one pound; water, sufficient to prevent an empyreuma. Macerate for 24 hours, and draw off one gallon.

323

From one pound of cinnamon the Edinburgh college direct 10 pounds of water to be drawn off; and if the cinnamon employed be of good quality, it may yield that quantity with a strong impregnation; but what comes over first is unquestionably the strongest.

This is a very grateful and useful water, possessing in an eminent degree the fragrance and aromatic cordial virtues of the spice. Where real cinnamon water is wanted, care should be had in the choice of the cinnamon, to avoid the too common imposition of cassia being substituted in its room. The two drugs may be easily distinguished from each other by a variety of marks, which it is needless to introduce in this place. See CASSIA and CINNAMON. But the essential oils of the two approach so near, that after distillation it is perhaps impossible to distinguish the waters; and it is still more doubtful how far the one is in any degree preferable to the other.

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The oil of cinnamon is very ponderous, and arises more difficultly than that of any other of the vegetable matters from which simple waters are ordered to be drawn. This observation directs us, in the distillation of this water, to use a quick fire and a low vessel. For the same reason, the water does not keep so well as might be wished; the ponderous oil parting from it in time, and falling to the bottom, when the liquor loses its milky hue, its fragrant smell, and aromatic taste. Some recommend a small proportion of sugar to be added, in order to keep the oil united with the water.

Cassia-water. E.

324 From a pound and a half of the cassia bark, ten pounds of water are directed to be drawn off in the same manner as the still-water.

This distilled water, as we have already observed, when properly prepared, approaches so near to that of cinnamon, that it is almost, if not altogether, impossible to distinguish the difference between the two. And although the London college has given it no place in their pharmacopœia, yet we may venture to assert, that it is no stranger to the shops of the apothecaries. Nay, so great is the difference of price, and the sensible qualities so nearly alike, that what is sold under the name of cinnamon-water is almost entirely prepared from cassia alone; and not even prepared from the cassia bark, as directed by the Edinburgh college, but from the cassia buds, which may be had at a still cheaper rate, and which yield precisely the same essential oil, although in less quantity. When cassia-water is prepared precisely according to the directions of the Edinburgh college, from containing a larger proportion of the subject, it has in general a stronger impregnation than their genuine cinnamon-water, and is probably in no degree inferior in its virtues.

Fennel-water. L.

325 Take of sweet fennel seeds, bruised, one pound; water, sufficient to prevent an empyreuma. Draw off one gallon.

The water of fennel seeds is not unpleasant. A water has also been distilled from the leaves. When these are employed, they should be taken before the plant has run into flower; for after this time they are much weaker and less agreeable. Some have observed, that the upper leaves and tops, before the flowers appear, yield a more elegant water, and a remarkably finer essential oil than the lower ones; and that the oil obtained from the one swims on water, while that of the other sinks. No part of the herb, however, is equal in flavour to the seeds.

Peppermint-water.

326 Take of herb of peppermint, dried, one pound and an half; water, sufficient to prevent an empyreuma. Draw off one gallon. *L.*

From three pounds of the leaves of peppermint, ten pounds of water are to be drawn off. *E.*

This is a very elegant and useful water. It has a warm pungent taste, exactly resembling that of the peppermint itself. A spoonful or two taken at a time warm the stomach, and give great relief in cold flatulent colics. Some have substituted a plain infusion of

the dried leaves of the plant, which is not greatly different in virtue from the distilled water.

In the distillation of this water, a considerable quantity of essential oil generally comes over in its pure state. And it is not uncommon to employ this for impregnating other water, with which it may be readily mixed by the aid of a little sugar.

Spear-mint-water. L.

Take of spear-mint, dried, one pound and an half; water, sufficient to prevent an empyreuma. Draw off one gallon. 327

The Edinburgh college directs this water to be made in the same proportion as the preceding. But probably three pounds of the fresh herb will not give a stronger impregnation than a pound and a half of the dried: so that the water of the London college may be considered to be as strongly impregnated as that of the Edinburgh college.

This water smells and tastes very strongly of the mint; and proves in many cases an useful stomachic. Boerhaave commends it (cobobated) as a pleasant and incomparable remedy for strengthening a weak stomach, and curing vomiting proceeding from cold viscid phlegm, and also in dysenteries.

All-spice water. L. E.

Take of all-spice, bruised, half a pound; water, sufficient to prevent an empyreuma. Macerate for 24 hours, and draw off one gallon. 328

From half a pound of the pimento the Edinburgh college directs ten pounds of water to be drawn off; so that the impregnation is there somewhat weaker than the above.

This distilled water is a very elegant one, and has of late come pretty much into use; the hospitals employ it as a succedaneum to the more costly spice-waters. It is, however, inferior in gratefulness to the spirituous water of the same spice hereafter directed.

Pennyroyal-water. L. E.

Take of dried herb pennyroyal, one pound and an half; water, sufficient to prevent an empyreuma. Draw off one gallon. 329

The pennyroyal-water is directed to be prepared by the Edinburgh college in the same proportions as the mint and peppermint. Whether prepared from the recent or dried plant, it possesses in a considerable degree the smell, taste, and virtues, of the pennyroyal. It is not unfrequently employed in hysterical cases, and sometimes with a good effect.

Rose-water. L. E.

Take of fresh petals of the damask rose, the white heels being cut off, six pounds; water, sufficient to prevent an empyreuma. Draw off one gallon. 330

From the same quantity the Edinburgh college directs ten pounds to be drawn off.

This water is principally valued on account of its fine flavour, which approaches to that generally admired in the rose itself. The purgative virtue of the roses remains entire in the liquor left in the still, which has therefore been generally employed for making the solvent honey and syrup, instead of a decoction or infusion of fresh roses prepared on purpose; and this piece

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piece of fragility the college have now admitted. A distilled water of red roses has been sometimes called for in the shops, and supplied by that of damask roses diluted with common water. This is a very venial substitution; for the water drawn from the red rose has no quality which that of the damask does not possess in a far superior degree; neither the purgative virtue of the one nor the astringency of the other arising in distillation.

Lemon-peel-water. E.

- 331 From two pounds of recent lemon peel ten pounds of water are to be drawn off by distillation.

Orange-peel-water. E.

- 332 From two pounds of orange peel ten pounds of water are directed to be drawn off.

Neither of these distilled waters are now to be met with in the London pharmacopœia; and it is probable that no great loss arises from the want of them, for both the one and the other contain only a very weak impregnation. They are chiefly employed as diluents in fevers and other disorders where the stomach and palate are very apt to be disgusted. And perhaps the only circumstance for which they are valuable is the slightness of the impregnation; for in such affections, any flavour, however agreeable at other times, often becomes highly disgusting to patients.

The distilled waters above noticed are the whole that have now a place in the pharmacopœias of the London and Edinburgh colleges; and perhaps this selection is sufficiently large for answering every useful purpose. But besides these, a considerable number of others are still retained even in the modern foreign pharmacopœias; some of which at least it may not be improper to mention.

Alexiterial water. Brun.

- 333 Take of elder flowers, moderately dried, three pounds; angelica leaves, fresh gathered, two pounds; spring water, forty pounds. Draw off, by distillation, thirty pounds.

This water is sufficiently elegant with regard to taste and smell; though few expect from it such virtues as its title seems to imply. It is used occasionally for vehicles of alexipharmac medicines, or in juleps to be drank after them, as coinciding in the intention; but in general is not supposed to be itself of any considerable efficacy.

Camphor-water. Brun.

- 334 Take of camphor, an ounce and an half. Let it be dissolved in half an ounce of the spirit of rosemary, then pour on it two pounds of spring water, and draw off by distillation a pound and an half.

This distilled water, which has no place in our pharmacopœias, is introduced into some of the foreign ones. And since camphor may be considered as a concrete essential oil, it naturally occurs as a form under which that medicine may be introduced with advantage in a diluted state.

Castor-water. Brun.

- 335 Take of Russia castor, one ounce; water, as much as will prevent burning. Draw off two pints.

Castor yields almost all its flavour in distillation to water, but treated in the same manner with spirit of wine gives over nothing. The spirit of castor formerly kept in the shops had none of the smell or virtues of the drug; while the water here directed proves, when fresh drawn, very strong of it.

It is remarkable, that the virtues of this animal substance reside in a volatile oil, analogous to the essential oils of vegetables. Some are reported to have obtained, in distilling large quantities of this drug, a small portion of oil, which smelt extremely strong of the castor, and diffused its ungrateful scent to a great distance.

This water is used in hysteric cases, and some nervous complaints, though it has not been found to answer what many people expect from it. It loses greatly of its flavour in keeping.

And it is probably from this circumstance that it has no place either in our pharmacopœias or in the modern foreign ones; but at the same time, as possessing in a high degree the sensible qualities of the castor, it may be considered as justly deserving future attention.

Chervil-water. Gen.

Take of fresh leaves of chervil, one pound; spring water, as much as is sufficient for allowing eight pounds to be drawn off by distillation, at the same time avoiding empyreuma.

Although the chervil be but little employed in Britain, yet among some of the foreigners it is held in high esteem; and the distilled water is perhaps one of the most elegant forms under which its active parts can be introduced. But there is reason to believe that those diuretic powers, for which it has been chiefly celebrated, will be most certainly obtained from exhibiting it in substance, or under the form of the expressed juice of the recent plant.

Black-cherry-water. Succ.

Take of ripe black cherries bruised with the kernels, 20 pounds; pure water, as much as is sufficient for avoiding empyreuma. Draw off 20 pounds by distillation.

This water, although now banished from our pharmacopœias, has long maintained a place in the foreign ones, and even in Britain it is not unfrequently to be met with in the shops. It has often been employed by physicians as a vehicle, in preference to the other distilled waters; and among nurses who have the care of young children has been the first remedy against the convulsive disorders to which infants are so often subject.

This water has nevertheless of late been brought into disrepute, and has been esteemed poisonous. They observe, that it receives its flavour principally from the cherry stones; and that these kernels, like many others, bear a resemblance in taste to the leaves of the lauro-cerasus, which have been discovered to yield, by infusion or distillation, the most sudden poison known. Some physicians of Worcester have lately found, by trial purposely made, that a distilled water very strongly impregnated with the flavour of the cherry kernels (no more than two pints being distilled from fourteen pounds of the cherry stones) proved in like manner

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poisonous to brutes. The London college repeated the same experiment, and found the effects agreeable to those gentlemen's report.

It by no means follows from these trials, nor after such long experience can it be imagined, that black-cherry-water; when no stronger than the shops have been accustomed to prepare it, is unsafe. These kernels plainly resemble opium, and some other things, which poison only when taken in too great a quantity. The water from the very laurel leaves is harmless when duly diluted; and even spirit of wine proves a poison of its kind not greatly different, if drank to a certain degree of excess. Nor can it be concluded, from the trials with the strong black-cherry water on dogs, &c. that even this will have the same effects in the human body; the kernels of many sorts of fruits being in substance poisonous to brutes, though innocent to man.

It is possible, however, that this water in any degree of strength may not be altogether safe to the tender age of infants, where the principles of life are but just beginning as it were to move. It is possible that it may there have had pernicious effects without being suspected; the symptoms it would produce, if it should prove hurtful, being such as children are often thrown into from the disease which it is imagined to relieve. On these considerations, both the London and Edinburgh colleges have chosen to lay it aside; more especially as it has been too often counterfeited with a water distilled from bitter almonds, which are known to communicate a poisonous quality. It is, however, one of those active articles which may perhaps be considered as deserving farther attention.

Camomile-flower water. Dan.

338 Take of camomile flowers, dried in the shade, eight pounds; water, 72 pounds. Draw off by gentle distillation 48 pounds.

Camomile flowers were formerly ordered to be fermented previously to the distillation, a treatment which they do not need; for they give over, without any fermentation, as much as that process is capable of enabling them to do. In either case the smell and peculiar flavour of the flowers arise without any of the bitterness, this remaining behind in the decoction; which, if duly depurated and inspissated, yields an extract similar to that prepared from the flowers in the common manner. The distilled water has been used in flatulent colics and the like, but is at present held in no great esteem.

Strawberry-water. Succ.

339 From 20 pounds of strawberries 20 pounds of distilled water are drawn off, according to the same directions given for the preparation of the black cherry water.

Water thus impregnated with the essential oil of the strawberries some people will think of a very agreeable flavour, but any considerable medical power is not to be expected from it.

Hyssop-water. Succ.

340 From four pounds of the fresh leaves of hyssop six pounds of water are drawn off.

Hyssop-water has been held by some in considerable esteem as an uterine and pectoral medicine. It was Vol. XIV. Part I.

directed in a former edition of the Edinburgh pharmacopœia for making up the black pectoral troches, but is now exchanged for common water. Few at present expect any singular virtues from it, nor is it often to be met with in our shops, being now expunged from our pharmacopœias. It holds a place, however, in most of the foreign ones, and among ourselves there are still some practitioners who frequently employ it. But there can be no doubt that those medical properties which the hyssop contains may be more readily and effectually extracted by simple infusion.

White-lily water. Brun.

Lily-of-the-valley water. Brun.

To any quantity of these flowers four times their weight of water is to be added, and water drawn off by distillation in the proportion of two pounds to each pound of the flowers.

These waters must obtain some impregnation of that elegant essential oil on which the odour of flowers in their growing state depends. But they do not possess any remarkable medical properties.

Balm-water. Brun.

The green leaves of the balm are to be macerated with double their weight of water; and from each pound of the plant a pound and an half of water is to be drawn off.

This water contains a considerable impregnation from the balm, which yields its essential oil pretty freely on distillation. Though now banished from our pharmacopœias, it has still a place in most of the foreign ones. In the old editions of the Edinburgh pharmacopœia, this water was ordered to be cohobated or redistilled from fresh quantities of the herb. This management seems to have been taken from Boerhaave, who has a very high opinion of the water thus prepared: he says, he has experienced in himself extraordinary effects from it taken on an empty stomach; that it has scarce its equal in hypochondriacal and hysterical cases, the chlorosis, and palpitation of the heart, as often as those diseases proceed from a disorder of the spirits, rather than from any collection of morbid matter.

But whatever virtues are lodged in balm, they may be much more perfectly and advantageously extracted by cold infusion in aqueous or spirituous menstrua: in this last process, the liquor suffers no injury from being returned on fresh parcels of the herb; a few repetitions will load it with the virtues of the subject, and render it very rich. The impregnation here is almost unlimited; but in distilled waters it is far otherwise.

Rue water. Ross.

From each pound of rue, with a sufficient quantity of spring water to prevent empyreuma, two pounds of distilled water are to be drawn.

Rue gives over in this process the whole of its smell, and great part of its pungency. The distilled water stands recommended in epileptic cases, the hysterical passion, for promoting perspiration, and other natural secretions. But though it is a good deal employed abroad, it is with us falling into disrepute.

Savin-water.

This is distilled from the fresh leaves of savin, after the same manner as the other already mentioned.

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This water is by some held in considerable esteem for the same purposes as the distilled oil of savin. Boerhaave relates, that he has found it (when prepared by cohobation) to give an almost incredible motion to the whole nervous system; and that, when properly used, it proves eminently serviceable for promoting the menses and the hæmorrhoidal flux.

It has now, however, fallen so much into disrepute as to have no place either in our pharmacopœias or in the best modern foreign ones: But at the same time, when we reflect how readily savin yields a large proportion of active essential oil on distillation, it may perhaps be considered as better intitled to attention than some other distilled waters which are still retained.

Elder-flower water. Brun.

345

This is distilled from fresh elder flowers, after the same manner as the white-lily water.

This water smells considerably of the flowers; but is rarely used among us.

Sage-water. Brun.

346

This is directed to be prepared from the green leaves of the sage in the same manner as the balm water.

Sage leaves contain a considerable proportion of essential oil, which they yield pretty freely on distillation. But their whole medical properties may with still greater ease and advantage be extracted by simple infusion.

To the simple distilled waters the London college have annexed the following remarks.

We have ordered the waters to be distilled from the dried herbs, because fresh are not ready at all times of the year. Whenever the fresh are used, the weights are to be increased. But, whether the fresh or dried herbs be employed, the operator may vary the weight according to the season in which they have been produced and collected.

Herbs and seeds kept beyond the space of a year are less proper for the distillation of waters.

To every gallon of these waters add five ounces, by measure, of proof-spirit.

CHAP. XVIII. *Distilled Spirits.*

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THE flavours and virtues of distilled waters are owing, as was observed in the preceding chapter, to their being impregnated with a portion of the essential oil of the subject from which they are drawn. Spirit of wine, considered as a vehicle for these oils, has this advantage above water, that it is their proper menstruum, and keeps all the oil that rises with it perfectly dissolved into an uniform limpid liquor.

Nevertheless, many substances, which, on being distilled with water, impart to it their virtues in great perfection; if treated in the same manner with spirit of wine, scarcely give it any smell or taste. This difference proceeds from hence, that spirit is not susceptible of so great a degree of heat as water. Liquids

in general, when made to boil, have received as great a heat as they are capable of sustaining: now, if the extent of heat between freezing and boiling water, as measured by thermometers, be taken for a standard, spirit of wine will be found to boil with less than four-fifths of that heat, or above one-fifth less than the heat of boiling water. It is obvious, therefore, that substances may be volatile enough to rise with the heat of boiling water, but not with that of boiling spirit.

Thus, if cinnamon, for instance, be committed to distillation with a mixture of spirit of wine and water, or with a pure proof-spirit, which is no other than a mixture of about equal parts of the two; the spirit will rise first, clear, colourless, and transparent, and almost without any taste of the spice; but as soon as the more ponderous watery fluid begins to rise, the oil comes over freely with it, so as to render the liquor highly odorous, sapid, and of a milky hue.

The proof-spirits usually met with in the shops are accompanied with a degree of ill flavour; which, though concealed by means of certain additions, plainly discovers itself in distillation. This nauseous relish does not begin to rise till after the purer spirituous part has come over; which is the very time that the virtues of the ingredients begin also most plentifully to distil: and hence the liquor receives an ungrateful taint. To this cause principally is owing the general complaint, that the cordials of the apothecary are less agreeable than those of the same kind prepared by the distiller; the latter being extremely curious in rectifying or purifying the spirits (when designed for what he calls fine goods) from all ill flavour.

Ardent spirit. L.

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Take of rectified spirit of wine, one gallon; kali, made hot, one pound and an half; pure kali, one ounce. Mix the spirit of wine with the pure kali, and afterwards add one pound of the hot kali; shake them, and digest for twenty-four hours. Pour off the spirit, to which add the rest of the kali, and distil in a water bath. It is to be kept in a vessel well stoppered. The specific gravity of the alcohol is to that of distilled water as 815 to 1000.

We have already offered some observations on spirit of wine both in the state of what is called *rectified* and *proof-spirit*. But in the present formula we have ardent spirit still more freed from an admixture of water than even the former of these. And in this state it is unquestionably best fitted for answering some purposes. It may therefore be justly considered as an omission in the present edition of the Edinburgh pharmacopœia, that they have no analogous form. In former editions of this work, alcohol was directed to be prepared from French brandy. But this is rather too dear an article in this country for distillation; nor is the spirit obtained from it anywise preferable to one procurable from cheaper liquors. The coarser inflammable spirits may be rendered perfectly pure, and fit for the nicest purposes, by the following method.

If the spirit be exceedingly foul, mix it with about an equal quantity of water, and distil with a slow fire; discontinuing the operation as soon as the liquor begins to run milky, and discovers by its nauseous taste that the impure and phlegmatic part is rising. By this

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treatment, the spirit leaves a considerable portion of its foul oily matter behind it in the water, which now appears milky and turbid, and proves highly disagreeable to the taste. If the spirit be not very foul at first, this ablation is not necessary; if extremely so, it will be needful to repeat it once, twice, or oftener.

As vinous spirits arise with a less degree of fire than watery liquors, we are hence directed to employ, in the distillation of them, a heat less than that in which water boils; and if due regard be had to this circumstance, very weak spirits may, by one or two waxy distillations, be tolerably well freed from their aqueous phlegm; especially if the distilling vessels are of such a height, that the spirit, by the heat of a water-bath, may but just pass over them: in this case, the phlegmatic vapours which rise for a little way along with the spirit, will condense and fall back again before they can come to the head. Very pompous instruments have been contrived for this purpose, and carried in a spiral or serpentine form to an extraordinary height. The spirit ascending through these, was to leave all the watery parts it contained in its passage, and come over perfectly pure and free from phlegm. But these instruments are built upon erroneous principles, their extravagant height defeating the end it was designed to answer: if the liquor be made to boil, a considerable quantity of mere phlegm will come over along with the spirit; and if the heat be not raised to this pitch, neither phlegm nor spirit will distil. The most convenient instrument is the common still; between the body of which and its head an adopter or copper tube may be fixed.

The spirit being washed, as above directed, from its foul oil, and freed from the greatest part of the phlegm by gentle distillation in a water-bath, add to every gallon of it a pound or two of pure dry fixed alkaline salt. Upon digesting these together for a little time, the alkali, from its known property of attracting water and oils, will imbibe the remaining phlegm, and such part of the disagreeable unctuous matter as may still be left in the spirit, and will sink with them to the bottom of the vessel. If the spirit be now again gently drawn over, it will rise entirely free from its phlegm and nauseous flavour; but some particles of the alkaline salt are apt to be carried up with it, and give what the workmen call an *urinous relish*: this may be prevented by adding, previous to the last distillation, a small proportion of calcined vitriol, alum, or bitter cathartic salt; the acids of these salts will unite with and neutralize the alkali, and effectually prevent it from rising; while no more of the acid of the salts is extricated than what the alkali absorbs.

The spirit obtained by this means is extremely pure, limpid, perfectly flavourless, and fit for the finest purposes. It may be reduced to the strength commonly understood by proof, by mixing twenty ounces of it with seventeen ounces of water. The distilled cordials made with these spirits prove much more elegant and agreeable, than when the common rectified or proof spirits of the shops are used.

If the rectified spirit be distilled afresh from dry alkaline salt with a quick fire, it brings over a considerable quantity of the salt; and in this state it is supposed to be a more powerful menstruum for certain

substances than the pure spirit. This alkalized spirit is called *tartarized spirit of wine*.

The process here described, which was long since recommended by Dr Lewis, will sufficiently explain the intention of the London college, in the directions they have now given for the preparation of alcohol. And there can be no doubt, that by their process a very pure alcohol may be obtained. Of this we have a sufficient test in the specific gravity of the fluid which comes over, which is to that of distilled water only as 815 to 1000, while the specific gravity of proper rectified spirit is as 835 to 1000.

Spirit of vitriolic æther. L.

Take of rectified spirit of wine, vitriolic acid, each one pound. Pour by a little at a time the acid on the spirit, and mix them by shaking; then from a retort through a tubulated receiver, to which another recipient is fitted, distil the spirit of vitriolic æther till sulphureous vapours begin to rise.

Vinous vitriolic acid, commonly called dulcified spirit of vitriol. E.

Take of vitriolic ethereal liquor, one part; rectified spirit of wine, two parts. Mix them.

The last of these processes is a very ready and convenient method of preparing the dulcified spirit of vitriol, which only differs from æther by the acid being more predominant, and less intimately combined.

In the first process, a good deal of caution is requisite in mixing the two liquors. Some direct the spirit of wine to be put first into the retort, and the oil of vitriol to be poured upon it all at once; a method of procedure by no means advisable, as a violent heat and ebullition always ensue, which not only dissipate a part of the mixture, but hazard also the breaking of the vessel, to the great danger of the operator. Others put the oil of vitriol into the retort first: then by means of a funnel, with a long pipe that may reach down just to the surface of the acid, pour in the spirit of wine; if this be done with sufficient caution, the vinous spirit spreads itself on the surface of the oil of vitriol, and the two liquors appear distinct. On standing for a week or two, the vinous spirit is gradually imbibed, without any commotion, and the vessel may then be safely shaken to complete the mixture: but if the spirit be poured in too hastily at first, or if the vessel be moved before the two liquors have in some degree incorporated, the same effect ensues as in the foregoing case. The only secure way is, to add the oil of vitriol to the spirit of wine by a little quantity at a time, waiting till the first addition be incorporated before another quantity is put in: by this management, the heat that ensues is inconsiderable, and the mixture is effected without any inconvenience.

The distillation should be performed with an equal and very gentle heat, and not continued so long as till a black froth begins to appear: for before this time a liquor will arise of a very different nature from the spirits here intended. The several products are most commodiously kept apart by using a tubulated receiver, so placed, that its pipe may convey the matter when it shall come over into a vessel set under it. The mixture of the retort and recipient is to be lined with a

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paste made of linseed meal, and further secured by a piece of wet bladder; the lower juncture may be closed only with some soft wax, that the vial may be occasionally removed with ease.

The true dulcified spirit arises in thin subtile vapours, which condense on the sides of the recipient in straight striæ. It is colourless as water, very volatile, inflammable, of an extremely fragrant smell, in taste somewhat aromatic.

After the fire has been kept up for some time, white fumes arise; which either form irregular stræ, or are collected into large round drops like oil: On the first appearance of these, the vial, or the receiver, if a common one is used, must be taken away. If another be substituted, and the distillation continued, an acid liquor comes over, of an exceeding pungent smell, like the fumes of burning brimstone. At length a black froth begins hastily to arise, and prevents carrying the process further.

On the surface of the sulphureous spirit is found swimming a small quantity of oil, of a light yellow colour, a strong, penetrating, and very agreeable smell. This oil seems to be nearly of the same nature with the essential oils of vegetables. It readily and totally dissolves in rectified spirit of wine, and communicates to a large quantity of that menstruum the taste and smell of the aromatic or dulcified spirit.

The matter remaining after the distillation is of a dark blackish colour, and still highly acid. Treated with fresh spirit of wine, in the same manner as before, it yields the same production; till at length all the acid that remains unvolatilized being saturated with the inflammable oily matter of the spirit, the compound proves a bituminous sulphureous mass; which, exposed to the fire in open vessels, readily burns, leaving a considerable quantity of fixed ashes; but in close ones it explodes with violence; with fixed alkaline salts it forms a compound nearly similar to one composed of alkalis and sulphur.

The new names adopted by the London and Edinburgh colleges for this fluid, are expressive of its composition; the one employing the term of *spiritus ætheris vitriolici*, the other of *acidum vitriolicum vinosum*: the old term of *spiritus vitrioli dulcis* is less properly fitted to distinguish it from other fluids, and to convey a just idea of its nature.

Dulcified spirit of vitriol has been for some time greatly esteemed, both as a menstruum and a medicine. It dissolves some resinous and bituminous substances more readily than spirit of wine alone, and extracts elegant tinctures from sundry vegetables. As a medicine, it promotes perspiration and the urinary secretion, expels flatulencies, and in many cases abates spasmodic strictures, eases pains, and procures sleep. The dose is from ten to eighty or ninety drops in any convenient vehicle. It is not essentially different from the celebrated anodyne liquor of Hoffman; to which it is, by the author himself, not unfrequently directed as a succedaneum.

Of this fluid, however, or at least of an article still more nearly resembling it, we shall afterwards have occasion to speak, when we treat of the vinous spirit of vitriolic æther.

Vitriolic æther. L.

Take of the spirit of vitriolic ether, two pounds; wa-

ter of pure kali, one ounce. Shake them together, and distil, with a gentle heat, fourteen ounces by measure.

Vitriolic ethereal liquor. E.

Take of rectified spirit of wine, vitriolic acid, each thirty-two ounces. Pour the spirit into a glass retort fit for sustaining a sudden heat, and add to it the acid in an uniform stream. Mix them by degrees, frequently shaking them moderately; this done, instantly distil from sand previously heated for that purpose, into a receiver kept cool with water or snow. But the heat is to be so managed, that the liquor shall boil at first, and continue to boil till 16 ounces are drawn off; then let the retort be raised out of the sand.

To the distilled liquor add two drams of the common bitter caustic; then distil again in a very high retort with a very gentle heat, into a cool receiver, until ten ounces have been drawn off.

If sixteen ounces of rectified spirit of wine be poured upon the acid remaining in the retort after the first distillation, an ethereal liquor may be obtained by repeating the distillation. This may be done pretty often.

The preparation of this singular fluid, now received into public pharmacopœias, was formerly confined to a few hands; for though several processes have been published for obtaining it, the success of most of them is precarious, and some of them are accompanied also with danger to the operator. The principal difficulty consists in the first part of the distillation.

It has been usual to direct the heat to be kept up till a black froth begins to appear: but if it is managed in the manner here directed, the quantity of æther which the liquor can afford will be formed and drawn off before this sulphureous froth appears. The use of the caustic alkali is to engage any uncombined vitriolic acid which may be present in the first distilled liquor. If a mild alkali were employed for this purpose, the separation of its air by the acid might endanger the bursting of the vessels. This last is indeed an inconvenience which attends the whole of this process. It might in a great measure be obviated by employing a range of receivers such as the siphon described in the first part of this work.

The æther, or ethereal spirit, is the lightest, most volatile and inflammable of all known liquids. It is lighter than the most highly rectified spirit of wine, in the proportion of about 7 to 8: a drop, let fall on the hand, evaporates almost in an instant, scarcely rendering the part moist. It does not mix, or only in a small quantity, with water, spirit of wine, alkaline lixivium, volatile alkaline spirits, or acids; but is a powerful dissolvent for oils, balsams, resins, and other analogous substances: it is the only known substance capable of dissolving the elastic gum; it has a fragrant odour, which, in consequence of the volatility of the fluid, is diffused through a large space. It has often been found to give ease in violent headaches, by being applied externally to the part; and to relieve the toothach, by being laid on the afflicted jaw. It has been given also internally, with benefit, in hooping coughs, hysterical cases, in asthma, and indeed in almost every spasmodic affection, from a few drops to the

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the quantity of half an ounce, in a glass of wine or water; which should be swallowed as quickly as possible, as the æther so speedily exhales.

Spirit of nitrous æther. L.

351 Take of rectified spirit of wine, two pints; nitrous acid, half a pound. Mix them, by pouring in the acid on the spirit, and distil with a gentle heat one pound ten ounces.

Vinous acid of nitre, commonly called dulcified spirit of nitre. E.

Take of rectified spirit of wine, three pounds: nitrous acid, one pound. Pour the spirit into a capacious phial, placed in a vessel full of cold water, and add the acid by degrees, constantly agitating them. Let the phial be slightly covered, and laid by for seven days in a cool place; then distil the liquor with the heat of boiling water, into a receiver kept cool with water or snow, till no more spirit comes over.

By allowing the acid and rectified spirit to stand for some time, the union of the two is not only more complete, but the danger also of the vessels giving way to the effulusion and heat consequent on their being mixed, is in a great measure prevented. By fixing the degree of heat to the boiling point, the superabundant acid matter is left in the retort, being too ponderous to be raised by that degree of heat.

Here the operator must take care not to invert the order of mixing the two liquors, by pouring the vinous spirit into the acid; for if he should, a violent effervescence and heat would ensue, and the matter be dispersed in highly noxious red fumes. The most convenient and safe method of performing the mixture seems to be, to put the inflammable spirit into a large glass bottle with a narrow mouth, placed under a chimney, and to pour into it the acid, by means of a glass funnel, in very small quantities at a time; shaking the vessel as soon as the effervescence ensuing upon each addition ceases, before a fresh quantity is put in: by this means the glass will be heated equally, and be prevented from breaking. During the action of the two spirits upon each other, the vessel should be lightly covered: if close stopped, it will burst; and if left entirely open, some of the more valuable parts will exhale. Lemery directs the mixture to be made in an open vessel; by which unscientific procedure, he usually lost, as he himself observes, half his liquor; and we may presume, that the remainder was not the medicine here intended.

Several methods have been contrived for obviating the inconveniences arising from the elastic fluid and violent explosions produced on the mixture of the nitrous acid and rectified spirit of wine: for preparing the nitrous æther they are absolutely necessary, and might perhaps be conveniently used for making the dulcified spirit. The method we judge to be the best, is that employed by Dr Black. On two ounces of the strong acid put into a phial, the doctor pours, slowly and gradually, about an equal quantity of water; which, by being made to trickle down the sides of the phial, floats on the surface of the acid without mixing with it: he then adds, in the same cautious

manner, three ounces of highly rectified spirit of wine, which in its turn floats on the surface of the water. By this means the three fluids are kept separate on account of their different specific gravities, and a stratum of water is interposed between the acid and spirit. The phial is now set in a cool place: the acid gradually ascends, and the spirit descends through the water, this last acting as a boundary to restrain their violent action on each other. By this method a quantity of nitrous æther is formed, without the danger of producing elastic vapours or explosion.

For the preparation of the dulcified spirit, the liquors, when mixed together, should be suffered to rest for some time, as above directed, that the fumes may entirely subside, and the union be in some measure completed. The distillation should be performed with a very slow and well regulated fire; otherwise the vapour will expand with so much force as to burst the vessels. Wilson seems to have experienced the justness of this observation, and hence directs the juncture of the retort and receiver not to be luted, or but slightly: if a tubulated recipient, with a sufficiently long pipe, be used, and the distillation performed with the heat of a water-bath, the vessels may be luted without any danger: this method has likewise another advantage, as it ascertains the time when the operation is finished: examining the distilled spirit every now and then with alkaline salts, as directed above, is sufficiently troublesome; while in a water-bath we may safely draw over all that will rise; for this heat will elevate no more of the acid than what is dulcified by the vinous spirit.

Dulcified spirit of nitre has been long held, and not undeservedly, in great esteem. It quenches thirst, promotes the natural secretions, expels flatulencies, and moderately strengthens the stomach: it may be given from 20 drops to a dram, in any convenient vehicle. Mixed with a small quantity of spirit of hartshorn, the volatile aromatic spirit, or any other alkaline spirit, it proves a mild, yet efficacious, diaphoretic, and often remarkably diuretic; especially in some febrile cases, where such a salutary evacuation is wanted. A small proportion of this spirit added to malt spirits, gives them a flavour approaching to that of French brandy.

Spirit of ammonia. L.

Take of proof-spirit, three pints; sal ammoniac, four ounces; pot-ash, six ounces. Mix and distil with a slow fire one pint and an half.

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Vinous spirit of sal ammoniac. E.

Take of quicklime, 16 ounces; sal ammoniac, eight ounces; rectified spirit of wine, 32 ounces. Having slightly bruised and mixed the quicklime and ammoniacal salt, put them into a glass retort; then add the spirit, and distil in the manner directed for the volatile caustic alkali, till all the spirit has passed over.

This spirit has lately come much into esteem, both as a medicine and a menstruum. It is a solution of volatile salt in rectified spirit of wine; for though proof-spirit be used, its phlegmatic part does not rise in the distillation, and serves only to facilitate the action of the pure spirit upon the ammoniacal salt.

Rectified

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Rectified spirit of wine does not dissolve volatile alkaline salts by simple mixture: on the contrary, it precipitates them, as has been already observed, when they are previously dissolved in water: but by the present process, a considerable proportion of the volatile alkali is combined with the spirit. It might perhaps, for some purposes, be more advisable to use with this intention the volatile spirit made with quicklime; for this may be mixed at once with rectified spirit of wine, in any proportion, without the least danger of any separation of the volatile alkali.

The name here employed by the London college, particularly when put in contradistinction to the water of ammonia, conveys a clear idea of the article, and is, we think, preferable to that employed by the Edinburgh college.

As a menstruum, the spirit of ammonia is employed to dissolve essential oils, thus forming the volatile aromatic spirit, or *compound spirit of ammonia*, as it is now called by the London college, which again is employed in making the tinctures of guaiac, valerian, &c.

The chief medical virtues which the spirit of ammonia possesses, when exhibited by itself, are those of the volatile alkali.

Fetid spirit of ammonia.

- 353 Take of proof-spirit, six pints; sal ammoniac, one pound; asafœtida, four ounces; pot-ash, one pound and a half. Mix them, and draw off by distillation five pints, with a slow fire. *L.*

Take of vinous spirit of sal ammoniac, eight ounces; asafœtida, half an ounce. Digest in a close vessel 12 hours; then distil off with the heat of boiling water eight ounces. *E.*

This spirit, the last formula of which is in our opinion the best, as being most easily prepared without any risk of being injured in the preparation, is designed as an antihysteric, and is undoubtedly a very elegant one. Volatile spirits, impregnated for these purposes with different fetids, have been usually kept in the shops; the ingredient here made choice of, is the best calculated of any for general use, and equivalent in virtue to them all. The spirit is pale when newly distilled, but acquires a considerable tinge in keeping.

Compound spirit of aniseed. *L.*

- 354 Take aniseed, angelica-seed, of each, bruised, half a pound; proof-spirit, one gallon; water, sufficient to prevent an empyreuma. Draw off one gallon by distillation.

This compound spirit is now directed to be prepared by the London college in the same manner as in their former edition. It has no place in the Edinburgh pharmacopœia; but it may justly be considered as a very elegant aniseed water. The angelica seeds greatly improve the flavour of the anise. It is often employed with advantage, particularly in cases of flatulent cholera; but it has been alleged to be sometimes too frequently used with this intention as a domestic medicine, especially by old ladies: for unless it be prudently and cautiously employed, it may soon be attended with all the pernicious consequences of drunkenness.

Spirit of caraway. *L.*

Take of caraway seeds, bruised, half a pound; proof-spirit, one gallon; water, sufficient to prevent an empyreuma. Draw off one gallon.

Spirituos caraway-water. *E.*

Take of caraway-seeds, half a pound; proof-spirit, nine pounds. Macerate two days in a close vessel; then pour on as much water as will prevent an empyreuma, and draw off by distillation nine pounds.

By this process the spirit obtains in great perfection the flavour of the caraway-seeds; and with some it is a cordial not uncommonly in use.

Spirit of cinnamon. *L.*

Take of bruised cinnamon one pound; proof-spirit, one gallon; water, sufficient to prevent an empyreuma. Draw off one gallon.

Spirituos cinnamon-water. *E.*

From one pound of cinnamon, nine pounds of spirit are to be drawn off, in the same manner as in the caraway spirit.

This is a very agreeable and useful cordial, but not so strong of the cinnamon as might be expected; for very little of the virtues of the spice arises till after the pure spirituoso part has distilled. Hence, in the former editions of the London pharmacopœia, the distillation was ordered to be protracted till two pints more than here directed were come over. By this means, the whole virtue of the cinnamon was more frugally than judiciously obtained; for the disagreeable flavour of the feints of proof spirits, and the acidulous liquor arising from cinnamon as well as other vegetables when their distillation is long continued, give an ill relish to the whole; at the same time that the oil which was extracted from the spice was by this acid thrown down.

In the Pharmacopœia Reformata, it is proposed to make this spirit by mixing the simple cinnamon water with somewhat less than an equal quantity of rectified spirit: on shaking them together, the liquor loses its milky hue, soon becomes clear, and more elegant than the water distilled as above: it is equally strong of the cinnamon, and free from the nauseous taint with which the common proof-spirits are impregnated.

Compound spirit of juniper. *L.*

Take of juniper-berries, bruised, one pound; caraway-seeds, bruised, sweet-fennel seeds, of each one ounce and an half; proof-spirit, one gallon; water, sufficient to prevent an empyreuma. Draw off one gallon.

Compound juniper-water. *E.*

Take of juniper-berries, well bruised, one pound; seeds of caraway, sweet-fennel, each one ounce and a half; proof-spirit, nine pounds; macerate two days; and having added as much water as will prevent an empyreuma, draw off by distillation nine pounds.

This water, mixed with about an equal quantity of the rob of juniper-berries, proves an useful medicine.

Preparations and Compositions.

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cine in catarrhs, debility of the stomach and intestines, and scarcity of urine. The water by itself is a good cordial and carminative: the service which this and other spirituous water do with these intentions is commonly known; though the ill consequences that follow from their constant use are too little regarded.

Spirit of lavender. L.

8 Take of fresh flowers of lavender, one pound and an half; proof-spirit, one gallon. Draw off by distillation in a water-bath, five pints.

Simple spirit of lavender. E.

Take of flowering spikes of lavender, fresh gathered, two pounds; rectified spirit of wine, eight pounds. Draw off by the heat of boiling water seven pounds.

This spirit, when made in perfection, is very grateful and fragrant: It is frequently rubbed on the temples, &c. under the notion of refreshing and comforting the nerves; and it probably operates as a powerful stimulus to their sensible extremities: it is likewise taken internally, to the quantity of a tea-spoonful, as a warm cordial.

Spirit of peppermint. L.

9 Take of the herb peppermint, dried, one pound and an half; proof-spirit, one gallon; water, sufficient to prevent an empyreuma. Draw off one gallon.

Spirituous peppermint-water. E.

From a pound and a half of these leaves nine pounds of spirit are drawn off, as from the caraway-seeds.

This spirit receives a strong impregnation from the peppermint. It is employed in flatulent colics and similar disorders; and in these it sometimes gives immediate relief: but where it is indicated, there are few cases in which the peppermint-water is not preferable.

Spirit of spearmint. L.

50 Take of spearmint, dried, one pound and an half; proof-spirit, one gallon; water, sufficient to prevent an empyreuma. Draw off one gallon.

This spirit has no place in the Edinburgh pharmacopœia. It, however, turns out a very elegant one, and preferable, in weakness of the stomach, retching to vomit, and the like, to many more elaborate preparations. Where the disorder is not accompanied with heat or inflammation, half an ounce of this water may be given diluted with some agreeable aqueous liquor: but, as was already observed with regard to the preceding article, there are many cases in which the prudent practitioner will be disposed to give the preference to the simple distilled water.

Spirit of nutmeg. L.

1 Take of bruised nutmegs, two ounces; proof-spirit, one gallon; water, sufficient to prevent an empyreuma. Draw off one gallon.

Spirituous nutmeg-water. E.

By two ounces of the nutmeg, well bruised, nine pounds of spirit are impregnated.

This is an agreeable spirituous liquor, highly impregnated with the nutmeg flavour. It was formerly celebrated in nephritic disorders, and when combined with a few hawthorn flowers, it had even the title of *nephritic water*. At present it is employed only as a cordial liquor, and is not even very frequently in use.

Spirit of pimento, or all-spice. L.

Take of all-spice, bruised, two ounces; proof-spirit, one gallon; water, sufficient to prevent an empyreuma. Draw off one gallon. 362

Spirituous Jamaica-pepper water. E.

By half a pound of pimento nine pounds of spirit are to be impregnated.

This water is far more agreeable than a simple water drawn from the same spice; and had long a place among the cordials of the distiller before it was received into any public pharmacopœia: but although now adopted both by the London and Edinburgh colleges, it is not very frequently ordered from the shops of the apothecary.

Spirit of pennyroyal. L.

Take of the herb pennyroyal, dried, one pound and an half; proof-spirit, one gallon; water sufficient to prevent an empyreuma. Draw off one gallon. 363

This spirit has no place in the Edinburgh pharmacopœia. It possesses, however, a considerable share of the flavour of the pennyroyal, and very frequently it is employed as a carminative and antihysterical.

Compound spirit of horse-radish. L.

Take of fresh horse-radish root, dried outer-rind of Seville oranges, each two pounds; fresh herb of garden scurvy-grass, four pounds; bruised nutmegs, one ounce; proof-spirit, two gallons; water, sufficient to prevent an empyreuma. Draw off two gallons. 364

This spirit has long been considered as an elegant one, and is perhaps as well adapted for the purposes of an antiscorbutic as any thing that can be contrived in this form. It has been alleged, that the horse-radish and scurvy-grass join very well together, giving a similar flavour, though not a little disagreeable; that the nutmeg suppresses this flavour very successfully, without superadding any of its own; and that to this, orange-peel adds a flavour very agreeable. Arum root had formerly a place in this water, but is here deservedly thrown out; for it gives nothing of its pungency over the helm, notwithstanding what is asserted by some pharmaceutical writers to the contrary. Mustard-seed, though not hitherto employed in these kinds of compositions, would seem to be an excellent ingredient; it gives over the whole of its pungency, and is likewise less perishable than most of the other substances of this class: this seed wants no addition, excepting some aromatic material to furnish an agreeable flavour.

But although this process may furnish an agreeable compound spirit, yet it is much to be doubted, whether it possess those antiscorbutic powers for which it was once celebrated. And with this intention the Edinburgh college place so little confidence in it, that they have now rejected it from their pharmacopœia.

Spirit of rosemary.

Take of fresh tops of rosemary, one pound and a half; proof-spirit, one gallon. Distil in a water-bath, five pints. *L.*

365

Take of flowering tops of rosemary, fresh gathered, two pounds; rectified spirit of wine, eight pounds. Distil in the heat of boiling water till seven pounds come over. *E.*

A spirit similar to this is generally brought to us from abroad, under the name of *Hungary-water*.

This spirit is very fragrant, so as to be in common use as a perfume: that brought from abroad is superior in fragrance to such as is generally made among us. In order to prepare it in perfection, the vinous spirit should be extremely pure; the rosemary tops gathered when the flowers are full blown upon them, and committed immediately to distillation, care being taken not to bruise or press them. The best method of managing the distillation, is that which was formerly recommended for the distillation of the more volatile essential oils and simple waters, viz. first to place the spirit in the still, and then set in, above the liquor, either an iron hoop, with a hair-cloth stretched over it, upon which the flowers are to be lightly spread, or rather a basket, supported on three pins, reaching down to the bottom. A gentle heat being applied, just sufficient to raise the spirit, its vapour lightly percolating through the flowers, will imbibe their finer parts, without making that disagreeable alteration, which liquors applied to such tender subjects, in their grosser form, generally do. Probably the superiority of the French Hungary-water, to that prepared among us, is owing to some skilful management of this kind, or to employing a perfectly pure spirit.

In the Wirtemberg pharmacopœia, some fige and ginger are added, in the proportion of half a pound of the former, and two ounces of the latter, to four pounds of the rosemary.

But the peculiar agreeable flavour of this water in all probability depends on the rosemary alone.

Carmelite water, or compound balm-water. *Dan.*

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Take of fresh gathered leaves of balm, a pound and a half; the recent yellow rind of lemons four ounces; nutmeg, coriander, each two ounces; cloves, cinnamon, each one ounce. The ingredients being sliced and bruised, pour upon them rectified spirit of wine, six pounds; balm-water, three pounds. Digest for three days, then draw off six pounds by distillation.

This spirit has been a good deal celebrated, particularly among the French, under the title of *Eau de Carnes*. Mr Beaumé, in his *Elémens de Pharmacie*, proposes some improvements on the process. After the spirit added to the ingredients has been drawn off in the heat of a water-bath, he orders the distilled liquor to be rectified by a second distillation, drawing off somewhat less than nine-tenths of it. He recommends, that all the aromatic spirits should be prepared in the same manner. When the common spirits of this kind are rubbed on the hands, &c. they leave, after the more volatile parts have exhaled, a disagreeable empyreumatic smell; and when diluted with water, and taken medicinally, they leave, in like manner, a nause-

ous flavour in the mouth. To remedy these imperfections, he made many experiments, which showed, that in order to obtain these liquors of the desirable qualities, the spirit must not only be perfectly pure at first, but that the liquor ought also to be rectified after it has been distilled from the subjects. In this rectification, only the more volatile, subtile, aromatic parts of the ingredients arise: there remains behind a white liquor, acrid, bitter, loaded only with the grosser oil, and deprived of all the specific flavour of the subjects. Indeed the very imperfection complained of naturally points out this second distillation as the remedy; for it shows the spirit to contain a grateful and ungrateful matter; the first of which exhales, while the other is left behind. The author says, that when the *aqua melisse* is prepared as above directed, it has something in it more perfect than any of the odoriferous spirits, whose excellence is cried up, and which have the reputation of being the best.

Aromatic spirituous liquors have in general less smell, when newly distilled, than after they have been kept about six months. M. Beaumé suspects that the preparations of this kind which have been most in vogue, were such as have been thus improved by keeping; and found that the good effects of age might be produced in a short time by means of cold. He plunges quart bottles of the liquor into a mixture of pounded ice and sea-salt; the spirit, after having suffered, for six or eight hours, the cold thence resulting, proves as grateful as that which has been kept for several years. Simple waters also, after being frozen, prove far more agreeable than they were before, though they are always less so than those which have been drawn with spirit, and exposed to a like degree of cold. This melioration of distilled waters by frost was taken notice of by Geoffroy.

Spirit of scurvy-grafs. *Succ.*

Take of fresh scurvy-grafs, bruised, 10 pounds; rectified spirit of wine, eight pints. With the heat of a water-bath, distil off four pints.

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This spirit is very strong of the scurvy-grafs; and has been given, in those cases where the use of this herb is proper, from 20 to 100 drops. The virtues of scurvy-grafs reside in a very subtile, volatile oil, which arises in distillation both with water and pure spirit; and if the liquors are exposed to the air, soon exhales from both. The spirit, newly distilled, is extremely pungent; but if long kept, even in close vessels, it becomes remarkably less so: but it is not probable, that with such a pungent vehicle we can use a sufficient quantity of the herb to produce any permanent or considerable effect; it has been much recommended as a diuretic in dropsies.

The makers of this spirit have frequently added to the scurvy-grafs a quantity of horse radish root, and sometimes substituted for it one drawn entirely from the horse-radish: the flavour of these two simples being so much alike, that their distilled spirits are scarcely distinguishable from each other. Here it may be observed, that though *arum* and *dracunculus* are usually ranked in the same class with the two foregoing vegetables, and considered as similar to them; this process discovers a remarkable difference: while the former

yield

yield all their pungency in distillation both to water and spirit; the latter give over nothing to either, and yet their virtues are destroyed in the operation.

Orange-peel water. Suec.

- 368 Take of recent orange skins, one pound; proof-spirit, three pounds. Draw off two pounds by the heat of a water-bath.

This spirit, which is now rejected from our pharmacopæias, had formerly a place in them under the title of *aqua corticum aurantium spirituosæ*. It is considerably stronger of the orange-peel than the simple water; and it is used as an useful cordial, stomachic, and carminative.

Aromatic spirit. Suec.

- 369 Take of the tops of rosemary, a pound and an half; tops of milfoil, thyme, each half a pound; proof spirit, 16 pounds; macerate for two days, and draw off by distillation eight pounds. If before distillation eight pounds of vinegar be added, it forms the acetated aromatic spirit.

These preparations do not differ materially from the spirit of rosemary or Hungary water; for on the essential oil of the rosemary their medicinal properties may be considered as chiefly depending. They are often employed, particularly for external purposes, and for impregnating the air with their vapours, to destroy the influence of febrile contagions.

Antidæric spirit. Gen.

- 370 Take of spirit of turpentine, an ounce and an half; rectified spirit of wine, half a pound. Distil with a gentle heat. Let the oil swimming above in the receiver be separated from the saturated spirit, which is to be preserved for use.

It has been imagined, that this combination of oil of turpentine with ardent spirit will furnish an effectual solvent for biliary calculi. Hence the origin of the name here given it; but although it may have such an effect when copiously applied to the calculi in a glass vessel; yet this is not to be expected when it is taken into the stomach, and can only reach them in the course of circulation.

CHAP. XIX. *Decoctions and infusions.*

- 371 WATER, the direct menstruum of gums and salts, extracts readily the gummy and saline parts of vegetables. Its action, however, is not limited to these; the resinous and oily principles being, in most vegetables, so intimately blended with the gummy and saline, as to be in part taken up along with them: some of the resinous cathartics, and most of the aromatic herbs, as well as bitters and astringents, yield to water the greatest part of their smell, taste, and medicinal virtue. Even of the pure essential oils, and odorous resins of vegetables, separated from the other principles, water imbibes a part of the flavour; and by the artificial admixture of gummy or saline matter, the whole substance of the oil or resin is made soluble in water.

Of pure salts, water dissolves only certain determinate quantities: by applying heat, it is generally enabled to take up more than it can do in the cold, and

this in proportion to the degree of heat; but as the liquor cools, this additional quantity separates, and the water retains no more than it would have dissolved without heat. With gummy substances, on the other hand, it unites unlimitedly, dissolving more and more of them till it loses its fluidity. Heat expedites the action of the water, but cannot enable it to take up more than it would do by allowing it longer time in the cold. The active parts extracted from most vegetables by water, and oils and resins made soluble in water by the artificial admixture of gum, partake of this property of pure gums, being soluble without saturation.

It has been imagined, that vegetables in a fresh state, while their oily, resinous, and other active parts are already blended with a watery fluid, would yield their virtues to water more freely and more plentifully than when their native moisture has been dissipated by drying. Experience, however, shows, that dry vegetables in general give out more than fresh ones, water seeming to have little action upon them in their recent state. If, of two equal quantities of mint, one be infused fresh in water, and the other dried, and then infused in the like quantity of water for the same length of time, the infusion of the dry herb will be remarkably the strongest: and the case appears to be the same in all the vegetables that have been tried.

In all the preparations described in this chapter, it is to be understood that the subjects must be moderately and newly dried, unless when they are expressly ordered to be taken fresh; in which case it is to be judged that their virtues are destroyed or impaired by drying.

The native colours of many vegetables are communicated to water along with their medicinal matter; many impart a colour different from their own; and others, though of a beautiful and deep colour themselves, give scarcely any to the menstruum. Of the first kind are the yellow and red flowers; of the second, the leaves of most plants; of the third, some of the blue flowers, as those of cyanus and larkspur. Acid liquors change the infusions of most flowers, the yellow ones excepted, to a red; and alkalis, both fixed and volatile, to a green.

From animal substances water extracts the gelatinous and nutritious parts; whence glues, jellies, broths, &c.; and along with these, it takes up principles of more activity, as the acrid matter of cantharides. It dissolves also some portion of calcined calcareous earths, both of the animal and of the mineral kingdom, but has no action on any other kind of earthy matter.

The effect of boiling differs from that of infusion in some material particulars. One of the most obvious differences is, that as the essential oils of vegetables, in which their specific odours reside, are volatile in the heat of boiling water, they exhale in the boiling along with the watery steam, and thus are lost to the remaining decoction; whereas both in cold, and sometimes in hot infusions, they are preserved; although in the latter they are by no means perfectly so. Odorous substances, and those in general whose virtues depend on their volatile parts, are therefore unfit for this treatment. The soluble parts of these may, nevertheless, be united in this form with those bodies of a more fixed nature, by boiling the latter till their vir-

ness be sufficiently extracted, and then infusing the former in this decoction.

The extraction of the virtue of the subject is usually promoted or accelerated by a boiling heat; but this rule is less general than it is commonly supposed to be. We have already observed, that Peruvian bark gives out its virtue more perfectly by cold infusion than by coction. In some cases, boiling occasions a manifest division of the principles of the subject: thus, when almonds are triturated with cold water, their oil, blended with the muilaginous or other soluble matter of the almond, unites with the water into a milky liquor called an *emulsion*: but on boiling them in water, the oil separates and rises to the surface; and if the most perfect emulsion be made to boil, a like separation happens.

This also appears to take place, though in a less evident manner, in boiling sundry other vegetables; thus tobacco, asarum, and ipecacuanha, lose their active powers by boiling: nor does it appear that this change is effected merely by the discharge of volatile parts. From some late experiments, it has been found, that the distilled water of ipecacuanha was infinitely less emetic than the infusion from which it was distilled, and that the boiling liquor gradually assumes a black colour, indicating some kind of decomposition of parts: the same circumstances probably take place in boiling tobacco, asarum, and perhaps all vegetables whatever, though from their not producing such sensible operations on the living body, they cannot be so clearly discovered as in ipecacuanha, tobacco, or asarum. The experiments we allude to were made by Dr Irving, when a student in the college of Edinburgh; and they gained him the prize given by the Harveian Society of that place, for the best experimental inquiry concerning ipecacuanha.

It is for the above-mentioned reasons that we think many of the infusions should be made with cold water: it is, however, to be acknowledged, that this is not always absolutely necessary, and in extemporaneous practice it may be often very inconvenient; it is, however, proper to point out the advantages to be expected from this more tedious, but much more complete and elegant, method.

Vinegar extracts the virtues of several medicinal substances in tolerable perfection: but at the same time its acidity makes a remarkable alteration in them, or superadds a virtue of a different kind; and hence it is more rarely employed with this intention than purely aqueous or spirituous menstrua. Some drugs, however, for particular purposes, vinegar excellently assists, or coincides with, as squills, garlic, ammoniac, and others: and in many cases where this acid is itself principally depended on, it may be advantageously impregnated with the flavour of certain vegetables; most of the odoriferous flowers impart to it their fragrance, together with a fine purplish or red colour; violets, for instance, if fresh parcels of them are infused in vinegar in the cold for a little time, communicate to the liquor a pleasant flavour, and deep purplish red colour. Vinegar, like other acids, added to watery infusions or decoctions, generally precipitates a part of what the water had dissolved.

Decoction of marshmallows. E.

Take of dried marshmallow roots, four ounces; raisins of the sun, stoned, two ounces; water, seven pounds. Boil to five pounds; strain apart the strained liquor till the feces have subsided, then pour out the clear liquor.

The Edinburgh college have substituted this for the more complicated formula of the *Decoctum Nephriticum* of their former pharmacopœia, and it fully answers the intentions of that preparation: it is intended chiefly as an emollient, to be liberally drunk of in nephritic paroxysms; in which cases, by softening and relaxing the parts, it frequently relieves the pain, and procures an easy passage for the sterculous matter. This medicine is now made more simple than before, without any diminution of its virtue, by the rejection of wild carrot seed, reitharrow root, fig, linseed, and liquorice. The carrot seeds were indeed unfit for this form, as they give out little of their virtue to watery liquors.

Decoction of hartshorn. L.

Take of burnt and prepared hartshorn, two ounces; gum arabic, six drams; distilled water, three pints. Boil, constantly stirring, to two pints, and strain.

This decoction is used as common drink in acute diseases attended with a looseness, and where acrimonious humours abound in the primæ viæ. The gum is added, in order to render the liquor lightly glutinous, and thus enable it to sustain more of the calx; which is the ingredient on which the colour, but probably not the virtue, of the medicine depends. Calcined hartshorn has no quality from which it seems capable either of constringing and strengthening the vessels, giving a greater degree of consistency to thin fluids, or obtunding acrimonious humours. It blunts and absorbs acid juices; but acrimony and acidity are very different; there are few (perhaps none of the acute) disorders of adults attended with the latter; and few of infants are unaccompanied therewith. Some have proposed starch as an ingredient in these kinds of decoctions; a small quantity of this soft, gelatinous, farinaceous substance would seem to be greatly preferable to the earthy calx. It may be observed, that the water is not enabled by the boiling to dissolve any part of the calx; and that in the decoction, the earth is only diffused in substance through the water, as it would be by agitation.

For these reasons, this formula is now rejected by the Edinburgh college, notwithstanding the reputation in which it was held by Dr Sydenham, and other names of the first eminence. But as an absorbent of a similar nature, the Edinburgh college have introduced the following formula.

Chalk julep. E.

Take of prepared chalk, one ounce; purest refined sugar, half an ounce; mucilage of gum arabic, two ounces; rub them together; and add by degrees, water, two pounds and a half; spirituous cinnamon water, two ounces. Mix them.

In the former edition of the Edinburgh pharmacopœia,

preia, a preparation of this kind had the title of *decoc-
tum cretaceum*, and the chalk was directed to be boiled
with the water and gum. In the present formula, the
chalk is much more completely suspended by the mu-
cilage and sugar, which last gives also to the mixture
an agreeable taste; it is proper to employ the finest
sugar, as the redundant acid in the coarser kinds might
form with the chalk a kind of salt. It would perhaps
have been more proper to have added an aromatic, by
suspending the entire powder of cinnamon, or its oil,
by means of the mucilage and sugar: the method here
directed is, however, less exceptionable in this than in
many other preparations, as the precipitated matter of
the spirituous water will probably be inviscated in the
saccharine and mucilaginous matter. This is a very
elegant form of exhibiting chalk, and is an useful re-
medy in diseases arising from, or accompanied with,
acidity in the primæ viæ. It has been most frequen-
tly employed in fluxes proceeding from that cause. At
the same time that the mucilage serves to keep the
chalk uniformly diffused, it also considerably improves
its virtues by sheathing the internal surface of the in-
testines so often abraded in these affections. It is in-
deed probable, that chalk, as being somewhat astrin-
gent, is in some of these complaints preferable to mag-
nesia; both, however, are improper in dysentery, or
other fluxes attended with putrescent matter in the
primæ viæ, or a general tendency to a putrefaction of
the fluids.

Decoction of Peruvian bark. L.

375 Take of Peruvian bark, powdered, one ounce; distilled
water, one pint and three ounces. Boil, for ten mi-
nutes, in a covered vessel, and strain the liquor while
hot.

Although a cold watery infusion of bark is in ge-
neral preferable to any decoction, yet this form has at
least the advantage of being more quickly prepared.
And the decoction here directed, which is boiled only
for a short time, and strained while hot, is preferable
to any other.

This decoction should be passed only through a coarse
strainer, and drank while turbid: if suffered to stand till
clear, the more efficacious parts of the bark will subside.
We have formerly observed, that the virtues of this
drug consist chiefly in its resinous substance, which,
though it may be totally melted out by the heat of
boiling water, remains only partially suspended in that
medium.

Decoction for a clyster. L.

376 Take of the dried leaves of mallow, one ounce; dried
camomile flowers, half an ounce; water, one pint.
Boil, and strain.

The title of this decoction sufficiently expresses its
use, as the basis of glysters. The ingredients should
be very lightly boiled, or at least the camomile flowers
should not be put in till towards the end, a part of
their virtue being soon lost by boiling.

Decoction for fomentation. L.

377 Take of the dried leaves of southernwood, the dried
tops of sea wormwood, dried camomile flowers, each
one ounce; dried bay-leaves, half an ounce; distilled
water, six pints. Boil them a little, and strain.

Common decoction. E.

Take of camomile flowers, one ounce; carvy seeds,
half an ounce; water, five pounds. Boil for a quar-
ter of an hour, and strain.

This decoction is intended to answer the purposes
of both the foregoing. It is less loaded with ingre-
dients than either, but not perhaps for that reason the
less useful.

It is indeed to be acknowledged, that these impreg-
nations are for the most part unnecessary for the pur-
pose of glysters; and in ordinary cases the weight of
the water usually solicits a discharge before these me-
dicines can produce any effect.

As to fomentations, their virtues in our opinion are
totally to be ascribed to the influence of the warm wa-
ter. And when the herbs themselves are applied, they
act only as retaining heat and moisture for a longer
time.

Decoction of hellebore. L.

Take of the root of white hellebore, powdered, one
ounce; distilled water, two pints; rectified spirit of
wine, two ounces. Boil the water with the root to
one pint; and, the liquor being cold and strained,
add to it the spirit.

White hellebore, as we formerly observed, is now
very rarely employed internally; and the present for-
mula is entirely intended for external use. Recourse
is sometimes had to it with advantage in cutaneous
eruptions, particularly in tinea capitis. But where the
incrustations are entirely removed, leaving a very ten-
der skin, it is necessary that the decoction should be
diluted previous to its employment.

Decoction of barley. L.

Take of pearl-barley, two ounces; distilled water, four
pints. The barley being first washed with cold wa-
ter from the adhering impurities, pour upon it about
half a pint of water, and boil the barley a little
time. This water being thrown away, add the di-
stilled water, boiling, to the barley; boil it to two
pints, and strain.

Compound decoction of barley. L.

Take of the decoction of barley, two pints; raisins,
stoned, figs, sliced, each two ounces; liquorice-root,
sliced and bruised, half an ounce; distilled water,
one pint. Boil to two pints, and strain.

Barley-water. E.

Take of pearl barley, two ounces; water, five pints.
First wash the barley from the mealy matter that
adheres to it with some cold water; then boil it a
little with about half a pint of fresh water, which
will acquire a considerable tinge from it. Throw
away this tinged water; put the barley into the five
pints of boiling water prescribed; and continue the
boiling till half the water be wasted.

These liquors are to be drank freely as a diluter, in
fevers and other disorders; hence it is of consequence
that they should be prepared so as to be as elegant and
agreeable as possible; for this reason they are inserted
in the pharmacopœia, and the several circumstances
which contribute to their elegance set down; if any
one of them be omitted, the beverage will be less grate-
ful.

ful. However trivial medicines of this class may appear to be, they are of greater importance in the cure of acute diseases than many more elaborate preparations.

Barky-water, however, is much more frequently prepared by nurses than apothecaries, particularly in its simple state. The compound decoction contains a large proportion of saccharine and mucilaginous matter, and may be employed for the same purposes as the decoction of marshmallows of the Edinburgh pharmacopæia.

Decoction of the woods. E.

- 383 Take of guaiacum saw-dust, three ounces; raisins of the sun, stoned, two ounces; assafras wood, shaved, liquorice, sliced, each one ounce; water, ten pounds. Boil the guaiacum and raisins with the water, over a gentle fire, to the consumption of one half; adding, towards the end the assafras and liquorice. Strain out the liquor; and having suffered it to rest for some time, pour off the clear from the feces without expression.

This decoction is very well contrived; and if its use be duly continued, it will do great service in some cutaneous diseases, in what has been called foulness of the blood and juices, and in some disorders of the breast; particularly in phlegmatic habits. It may be taken by itself to the quantity of a quarter of a pint two or three times a day, or used as an assistant in a course of mercurial or antimonial alteratives; the patient in either case keeping warm, in order to promote the operation of the medicine. The saw-dust exposes a larger surface to the action of the water than the shavings, directed in the former edition of the pharmacopæia.

Decoction of sarsaparilla. L.

- 384 Take of the root of sarsaparilla, sliced, six ounces; distilled water, eight pints. Macerate for two hours, with an heat of about 195; then take out the root, and bruise it; return the bruised root to the liquor, and again macerate it for two hours. Then, the liquor being boiled to four pints, press it out, and strain.

This decoction is an article in very common use, particularly in venereal affections. And there can be little doubt, that by this process the medical powers of the sarsaparilla are fully extracted. But it has of late been much questioned, whether this article be in any degree intitled to the high character which was once given of it. Some, as we have already observed, are even disposed to deny its possessing any medical property whatever: but the general opinion is, that it has somewhat of a diaphoretic effect; and this effect is more readily obtained when it is exhibited under the form of decoction than under any other.

Compound decoction of sarsaparilla. L.

- 385 Take of the root of sarsaparilla, sliced and bruised, six ounces; bark of the root of assafras, raspings of guaiacum-wood, liquorice root, bruised, of each one ounce; bark of the root of mezereon, three drams; distilled water, ten pints. Macerate, with a gentle heat, for six hours; then boil it down to five pints, adding, towards the end, the bark of the root of mezereon, and strain the liquor.

This compound decoction is an elegant mode of preparing an article once highly celebrated under the title of the *Lisbon diet drink*. That formula, for a long time after its first introduction into Britain, was kept a secret; but an account of the method of preparation was at length published in the *Physical and Literary Essays* of Edinburgh, by Dr Donald Monro. And of the formula there given, which is in many respects an unchemical one, the present may justly be considered as an improvement. Even in its original form, but still more in the present state, there can be no doubt, that it furnishes us with a very useful medicine, particularly in those obstinate ulcers originating from venereal infection, which resist the power of mercury. And it is highly probable, that its good effects principally depend on the impregnation it receives from the mezereon. Perhaps, however, even thus improved, it is more complicated and expensive than is necessary: at least we are inclined to think, that every advantage derived from it may with equal ease and certainty be obtained from impregnating with the mezereon, in the manner here directed, a simple decoction of the guaiacum, bardana, or althæa, without having recourse to several articles, or employing one so expensive as the sarsaparilla.

Decoction of feneka. E.

- Take of feneka, or rattlesnake root, one ounce; water, two pounds. Boil to sixteen ounces, and strain.

The virtues of this decoction will be easily understood from those of the root from which it is prepared. The dose, in hydropic cases, and rheumatic, or arthritic complaints, is two ounces, to be repeated three or four times a day, according to its effect.

Decoction of elm. L.

- Take of the fresh inner bark of elm, bruised, four ounces; distilled water, four pints. Boil to two pints, and strain.

It has been chiefly, if not entirely, under this form of decoction, that the elm bark has been employed for combating those cutaneous eruptions against which it has of late been so highly celebrated. Any experience which we have had of it, however, in actual practice, by no means confirms the very favourable account which some have given of its use.

Mucilage of starch. L.

- Take of starch, three drams; distilled water, one pint. Rub the starch, by degrees adding the distilled water; then boil it a little time.

The mucilage thus formed of starch is very useful for answering these purposes where a glutinous substance is required, and in particular it is often successfully employed under the form of glyster.

Mucilage of gum arabic.

- Take of gum arabic, powdered, four ounces; boiling distilled water, eight ounces. Rub the gum with the water until it be dissolved.

Take of gum arabic, beat into powder, and warm water, each equal weights. Digest, and frequently stir them till the gum be dissolved, then press the solution through linen.

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It is very necessary to pass the mucilage through linen, in order to free it from pieces of wood and other impurities, which always adhere to the gum; the linen may be placed in a funnel.

Mucilage of gum arabic is very useful in many operations in pharmacy: it is also much used for properties peculiar to those substances of its own class, and of all the gums it seems to be the purest.

Mucilage of gum tragacanth. E.

- 390 Take of gum tragacanth, powdered, one ounce; hot water, eight ounces. Macerate twenty-four hours; then mix them, by rubbing briskly, that the gum may be dissolved; and press the mucilage through linen cloth.

This gum is more difficultly soluble in water than gum arabic, and seems to be considerably more adhesive; it is therefore fitter for forming troches, and such like purposes. It has been thought to be more peculiarly what has been called a *pectorat*, than the other gums; but this does not seem to be certainly founded. This mucilage is perhaps preferable to the foregoing in those operations in pharmacy where much tenacity is required; as in the suspension of mercury, or other ponderous bodies.

Mucilage of quince-seed. L.

- 391 Take of seeds of the quince, one dram; distilled water, eight ounces, by measure. Boil with a slow fire until the water thickens; then pass it through linen.

This is a pleasant soft mucilage, of a somewhat sweetish taste, and a light agreeable smell: in these respects, and in its easy solubility in water, it differs from the mucilage of gum tragacanth, to which some have supposed it similar: it has another difference, to its disadvantage, being apt to grow mouldy in keeping.

Compound infusion of gentian. L.

- 392 Take of the root of gentian, one dram; fresh outer-rind of lemons, half an ounce; dried outer rind of Seville oranges, one dram and an half. Boiling water, 12 ounces, by measure. Macerate for an hour, and strain.

Bitter infusion. E.

Take of gentian root, half an ounce; dried peel of Seville oranges, one dram; coriander seeds, half a dram; proof-spirit, four ounces; water, one pound. First pour on the spirit, and three hours thereafter add the water; then macerate without heat for a night, and strain.

These formulæ do not materially differ. That of the London college is the most expeditious mode of preparation; but that of the Edinburgh college possesses other advantages, which are in our opinion more than sufficient to outweigh that circumstance.

In the former edition of the Edinburgh pharmacopœia the water was directed to be boiling: this was at least unnecessary, and was probably liable to the objections observed against decoctions. The proof-spirit is also an useful addition to the bitter infusion, as it now stands in the Edinburgh pharmacopœia: besides that it assists in extracting the resinous parts, and pre-

serving the infusion from fermentation, it communicates an agreeable pungency to the liquor. To answer in some measure these intentions, it was formerly directed to add to the filtrated liquor a quantity of aromatic water. This was certainly a piece of very bad pharmacy; for, besides that the spirit in this preparation, when diluted with the water of the infusion, was now no longer able to retain the suspended matter, it would also dispose the infusion to part with its proper extractive matter; and in this way the resinous matter of the aromatic water, and the gummy parts of the bitter infusion, would both in some degree separate to the bottom of the vessel. By the formula now laid down, the infusion contains the different principles of the ingredients in a manner more nearly approaching to their natural and entire state.

Simple infusion of fenna. L.

Take of fenna, an ounce and a half; ginger, powdered, one dram; boiling distilled water, one pint. Macerate them for an hour in a covered vessel; and the liquor being cold, strain it.

This, although a simple, is a very elegant infusion of fenna, the ginger acting as an useful corrigent. But if the fenna were employed to the quantity of a dram and an half or two drams only, with the same menstruum, in place of the quantity here ordered, it would be a no less useful medicine, and might be employed for one dose, as it is best when fresh. Of the present infusion, an ounce or two is a sufficient dose.

Tartarized infusion of fenna. L.

Take of fenna, one ounce and a half; coriander seeds, 1 ruled, half an ounce; crystals of tartar, two drams; distilled water, one pint. Dissolve the crystals of tartar by boiling in the water, then pour the water, as yet boiling, on the fenna and seeds. Macerate for an hour in a covered vessel, and strain when cold.

In the last edition of the London pharmacopœia this had the name of *infusum fennæ communis*.

Formerly an alkaline salt was used in the infusion of fenna instead of the acid one here directed. The first was supposed to promote the operation of the medicine, by superadding a degree of purgative virtue of its own, and by enabling the water to extract somewhat more from the capital ingredient than it would be capable of doing by itself; while acids were alleged to have rather a contrary effect. Experience, however, has sufficiently shown, that alkaline salts increase the offensiveness of the fenna, while crystals of tartar considerably improve the colour of the infusion, and likewise render the taste to some persons less disagreeable. Soluble tartar should seem a good ingredient to these kinds of composition, as it not only improves the taste, but promotes the purgative virtue of the medicine: this addition also renders the infusion less apt to gripe, or occasion flatulencies.

Infusion of tamarinds with fenna. E.

Take of tamarinds, six drams; crystals of tartar, fenna, each one dram; coriander seeds, half a dram; brown sugar-candy, half an ounce; boiling water, eight ounces. Macerate in a close earthen vessel which has not been vitrified with lead; stir the liquor now and

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and then, and after it has stood four hours strain it. It may also be made with double, triple, &c. the quantity of fenna.

Both this and the former infusions might be made with cold water. By this means the aromatic quality of the coriander seeds would probably be extracted in a more perfect state; but the crystals of tartar are so difficultly soluble in cold water, that for extemporaneous use it is in some measure necessary to prepare them in the manner here directed. It is not indeed probable, that when such soluble matters as acids and sugar are presented to water, the water shall be able to extract such a quantity of the finer volatile part of aromatics as to afford any considerable flavour to the liquor. Where an aromatic is required, we would therefore propose, that some agreeable aromatic water should be mixed with the liquor immediately before swallowing it; or that a quantity of aromatic oil should be incorporated with the cold infusion by means of gum, or a part of the sugar which might be reserved for that purpose. It is a very necessary caution not to make this infusion in vessels glazed with lead, otherwise the acid might corrode the lead, and communicate its poisonous effects to the infusion.

Both these infusions are mild and useful purges; the latter in particular is excellently suited for delicate stomachs, at the same time that it is very much calculated for febrile and other acute diseases. It is observable, that sugar added to neutral salts rather increases than diminishes their nauseousness; but when used along with an acid, such as tamarinds, or a salt wherein the acid predominates, as in crystals of tartar, it is found very much to improve their taste. The acid in this infusion, or rather the combination of acid and sweet, are found to cover the taste of the fenna very effectually: the aromatic serves also the same purpose, but would perhaps be better applied in the way above proposed.

Infusion of the rose. L.

296 Take of red rose-buds, the heels being cut off, half an ounce; vitriolic acid, diluted, three drams; boiling distilled water, two pints and a half; double-refined sugar, one ounce and a half. To the water, first poured on the petals in a glass vessel, add the diluted vitriolic acid, and macerate for half an hour. Strain the liquor when cold, and add the sugar.

Infusion, commonly called tincture of roses. E.

Take of red roses, dried, one ounce; boiling water, five pounds; vitriolic acid, one dram; white sugar, two ounces. Macerate the roses with the boiling water in an unglazed vessel four hours; then having poured on the acid, strain the liquor, and add the sugar.

Some have directed the vitriolic acid to be dropped upon the roses before the water is put to them; but this method is certainly faulty; for such of the roses as this caustic liquor falls on undiluted will be burnt up by it, and have their texture destroyed. Others have made an infusion of the roses in water first, and then added the acid, from an apprehension, that if this acid be added to the water, it would weaken its power as a menstruum; but whatever the acid spirit will hinder the water from extracting, it must precipitate

if added afterwards; though, in this preparation, the vitriolic acid bears so small a proportion to the water, that its effects in this respect will be very little; and it appears to be of little consequence which of the two ways be followed, only that by the above formula the vessels are exposed a shorter time to the action of the acid. The infusion should be made in a glass or stone-ware vessel, rather than a glazed earthen one; for the acid will be apt to corrode the glazing of the latter.

This infusion is of an elegant red colour, and makes a very grateful addition to juleps in hæmorrhages, and in all cases which require mild coolers and subastringents. It is sometimes taken with boluses or electuaries of the bark, and likewise makes a good gargle. But although in our pharmacopœias it has its name from the roses, yet its virtues are to be ascribed chiefly, or perhaps solely, to the vitriolic acid.

Infusion of rhubarb. E.

Take of rhubarb, half an ounce; boiling water, eight ounces; spirituous cinnamon water, one ounce. Macerate the rhubarb in a glass vessel with the boiling water for a night; then having added the cinnamon water, strain the liquor.

In this infusion cold water might perhaps be employed with advantage; we also object to the spirituous cinnamon-water on the same grounds as we did before to the aromatic water in the bitter infusion of the former edition of the Edinburgh pharmacopœia. This, however, appears to be one of the best preparations of rhubarb when designed as a purgative; water extracting its virtue more effectually than either vinous or spirituous menstrua. In this respect rhubarb differs from most of the other vegetable cathartics; and we think the London college might have given it a place in their pharmacopœia as well as the wine or tincture of rhubarb.

Lime-water.

Take of quicklime, half a pound; boiling distilled water, twelve pints. Mix, and set it aside in a covered vessel for an hour; then pour off the liquor, which keep in a close vessel. L.

Take half a pound of fresh-burnt quicklime, put it into an earthen vessel, and gradually sprinkle on it four ounces of water, keeping the vessel shut while the lime grows hot and falls into powder; then pour on it twelve pounds of water, and mix the lime thoroughly with the water by stirring. After the lime has subsided renew the stirring; and let this be done about ten times, always keeping the vessel shut (during the ebullition), that the access of the air may be the more effectually prevented. Lastly, let the water be filtered through paper placed in a funnel close shut at its top; and it must be kept in very close vessels. E.

The reason of adding the water by degrees to the lime is, that when poured on at once it reduces the external part to a kind of muddy substance, or soft paste, which in some measure defends the internal part from being acted on by the water. It does not appear that the different proportions of water in the two above prescriptions occasion any sensible difference in the strength of the product: the quicklime is far from yielding all its soluble parts to either proportion; the remainder

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remainder giving a strong impregnation to many fresh quantities of water, though not so strong as to the first. The caution of keeping the water in close-stopped vessels ought to be strictly attended to; for in open ones the calcareous matter dissolved in the liquor soon begins to separate, and forms a white crust on the surface. This crust is not of a saline nature, as some have imagined; but an insipid earth, no longer miscible with watery liquors. The theory of the production of this earth will be easily understood from what we have said on the article *Fixed Air*. The separation first takes place at the surface, as being the part immediately applied to the common air. As long as the crust remains entire, the closeness of its texture so excludes the air, that the rest of the matter still remains impregnated with lime; but when this pellicle is broken by any means, it soon sinks to the bottom, and exposes a new surface for the separation of the lime. In this way a succession of crusts and precipitations are formed, till the whole of the once caustic and soluble quicklime is now found at the bottom of the vessel in the state of a mild insoluble earth, leaving the water perfectly insipid.

The formation of these crusts, and their successive precipitations, are owing to the absorption of fixed air, or aerial acid, from the atmosphere; and the mild insoluble state of these precipitations is also owing to the same cause.

The distilled water recommended by the London college is certainly preferable to common fountain water; the purity of which can rarely be depended on.

Lime-water has been thought of great service in scrofulous complaints; but perhaps on no very good foundation. It has also been used both internally and externally for various affections of the skin. It seems to be very considerably astringent, and has been useful in some kinds of alvine fluxes, in diabetes, leucorrhœa, and in sundry other disorders proceeding from a laxity or debility of the solids.

Its more common use is in affections of the stomach accompanied with acidity and flatulence. For which last complaint, the mild or aerated earths are less proper, on account of the separation of air on their meeting with an acid in the stomach. Lime-water is also capable of dissolving mucus; and may therefore be used where a redundancy of the intestinal mucus affords a nidus for worms, or gives rise to other complaints. It has also been found, that lime-water injected into the anus immediately kills ascarides. The lithuriptic powers of lime-water seem at present to be much doubted. Lime-water is given in doses proportioned to the nature of the complaints; in some cases, as in diabetes, it may be given in divided portions to the extent of two quarts a-day. It is used externally for washing what are called *soul* or *ill-conditioned ulcers*; it is also injected into the vagina and other parts affected with preternatural discharges from laxity.

The use of lime-water in scurvy is very doubtful.

Vinegar of squills.

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Take of squills, dried, one pound; vinegar, six pints; proof-spirit, half a pint. Macerate the squills in the vinegar, with a gentle heat, in a glass vessel, for four-and-twenty hours; then press out the li-

quor, and set it by that the feces may subside: lastly, pour off the liquor, and add to it the spirit. *L.* Take of dried root of squilla, two ounces; distilled vinegar, two pounds and a half; rectified spirit of wine, three ounces. Macerate the squills with the vinegar eight days; then press out the vinegar, to which add the spirit; and when the feces have subsided, pour off the clear liquor. *E.*

Vinegar of squills is a medicine of great antiquity; we find in a treatise attributed to Galen, an account of its preparation, and of many particular virtues then ascribed to it. It is a very powerful stimulant, aperient, and what is called an attenuant of tenacious juices; and hence it is frequently used, with great success, in disorders of the breast occasioned by a load of thick phlegm, and for promoting urine in hydropic cases. The dose of this medicine is from a dram to half an ounce: where crudities abound in the first passages, it may be given at first in a larger dose, to evacuate them by vomiting. It is most conveniently exhibited along with cinnamon, or other agreeable aromatic waters, which prevent the nausea it would otherwise, even in small doses, be apt to occasion.

Aromatic vinegar. Succ.

Take of tops of rosemary, leaves of sage, each four ounces; flowers of lavender, two ounces; cloves two drams; vinegar, eight pounds. Macerate for four days, express the liquor, and strain it.

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This may be considered as an elegant improvement of what had formerly a place in the foreign pharmacopœias, under the title of *acetum prophylacticum*, which contained not only the present articles, but also a confused sarrago of others, as wormwood, rue, garlic, cinnamon, &c.

It is said, that during the plague at Marseilles, four persons, by the use of the *acetum prophylacticum* as a preservative, attended, unhurt, multitudes of those who were infected: that under colour of those services, they robbed both the sick and the dead: and that one of them being afterwards apprehended, saved himself from the gallows by discovering the remedy. The preparation was hence called *Vinaigre des quatre voleurs*; "The vinegar of the four thieves." It is not to be doubted that vinegar, impregnated with antiseptic vegetables, will contribute greatly to prevent the effects of contagious air. And in the present aromatic vinegar we have a stronger and better impregnation, than from the numerous articles which were before employed. We are far, however, from imagining that it will be able to counteract the contagion of the plague: but it may on different occasions be more powerful than vinegar in its simple state, for impregnating with antiseptic vapours the chambers of the sick.

Vinegar of roses. Succ.

Take of the flowers of red roses dried, any quantity; add to them twelve times their weight of vinegar. Macerate for four days, and strain through paper.

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This has been chiefly used for evincing the head and temples in some kinds of headach, &c. in which it has now and then been of service. It has also been used for certain cases of ophthalmia. But before it

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can be applied to the eyes, it will in general require to be diluted with water.

Vinegar of lead. Succ.

- 402 Take of litharge, triturated, half a pound; vinegar, two pounds. Direct them together, frequently stirring the mixture with a wooden rod, till the colour of blue paper be not changed by the vinegar; preserve for use the clear liquor which is above the sediment.

This liquor is of the same nature with solutions of sugar of lead, or acetated ceruse, as it is now called. It is only used externally against cutaneous eruptions, redness, inflammations, &c. But even in these cases some think it is not void of danger: and it is alleged, that there are examples of its continued use having occasioned sundry ill consequences. Of this, however, we are very doubtful. But by means of the acetated ceruse every purpose to be answered by this may be accomplished. This liquor differs only in the proportions from the water of acetated litharge of the London pharmacopœia.

Vinegar of colchicum. Ros.

- 403 Take of the recent root of colchicum cut into slices, one ounce; vinegar, one pound. Macerate with a gentle heat for two days: then strain after slight expression.

Although in our pharmacopœias a place be given to the oxymel and syrup of colchicum, both of which are formed from the vinegar, yet the vinegar itself is not directed to be kept in its separate state: under this form, however, it may often be employed with advantage.

Infusion of Peruvian bark. Succ.

- 404 Take of Peruvian bark, bruised, an ounce and a half; river water, boiling, a pound and a half. Digest for two hours, shaking the vessel frequently; then strain the liquor with expression.

The Peruvian bark, as we have already had occasion to observe, gives out its medical properties to water not less readily in the way of infusion than of decoction. And in the former, the extractive matter is even more in a state of solution. An infusion, however, not only more elegant, but stronger than the present, might be obtained, from employing cold instead of boiling water, and from continuing the maceration for a greater length of time. But in whatever manner it be formed, an infusion will often fit on the stomach, when the bark either in substance or decoction cannot be retained.

Tar-water. Succ.

- 405 Take of tar two pounds; water, one gallon. Stir them strongly together with a wooden rod; and after standing to settle for twelve hours, pour off the water for use.

Tar-water has lately been recommended to the world as a certain and safe medicine in almost all diseases; a slow yet effectual alterative in cachexies, scurvy, chlorotic, hysterical, hypochondriacal, and other chronic complaints; and a sudden remedy in acute distempers which demand immediate relief, as pleuritis,

peripneumonies, the small-pox, and all kinds of fevers in general. The medicine, though certainly far inferior to the character that has been given of it, is doubtless in many cases of considerable utility: it sensibly raises the pulse; and occasions some considerable evacuation, generally by perspiration or urine, though sometimes by stool or vomit. Hence it is supposed to act by increasing the vis vitæ, and enabling nature to expel the morbid humours.

We shall here insert, from the first public recommendation of this liquor (Bishop Berkeley), some observations on the manner of using it. "Tar-water, when right, is not paler than French, nor deeper coloured than Spanish, white wine, and full as clear; if there be not a spirit very sensibly perceived, in drinking, you may conclude the tar water is not good. It may be drank either cold or warm. In colics, I take it to be best warm. As to the quantity, in common chronic indispositions, a pint a day may suffice, taken on an empty stomach, at two or four times, viz. night and morning, and about two hours after dinner and breakfast: more may be taken by stronger stomachs. But those who labour under great and inveterate maladies, must drink a greater quantity, at least a quart every twenty-four hours. All of this class must have much patience and perseverance in the use of this, as well as of all other medicines, which, though sure, must yet in the nature of things be slow in the cure of inveterate chronic disorders. In acute cases, fevers of all kinds, it must be drank in bed warm, and in great quantity (the fever still enabling the patient to drink), perhaps a pint every hour, which I have known to work surprising cures. But it works so quick, and gives such spirits, that the patients often think themselves cured before the fever has quite left them."

Notwithstanding these encomiums, tar-water seems to be fast losing its reputation. It is not probable that water can take up any of the more active principles of the tar; and it would perhaps be more convenient to separate its acid by distillation, and mix it with water occasionally: for it is pretty certain, that the water can only take up the acid of the tar, perhaps charged with a very small quantity of oily matter in the state of an acid soap.

Decoction of catechu. Gen.

- Take of catechu, three drams; spring-water, two pounds: boil it to one pound; and add to the strained liquor, of syrup of quinces, three ounces.

This decoction may be considered as nearly similar to the decoctum japonicum, and decoctum terræ japonicæ of the former editions of our pharmacopœia: and like these it will be found a very agreeable and useful medicine in fluxes that are not critical or symptomatic, and in a weak lax state of the intestines. A spoonful or two may be taken every hour, or oftener: thus managed, it produces much better effects than if larger doses are given at once. But for extracting the powers of the catechu, boiling is not requisite. By simple infusion in warm water, all its active parts are readily and completely dissolved. It may in this manner also be readily united with cinnamon or other aromatics. And an infusum japonicum is, we think, a formula justly intitled to a place in our pharmacopœias.

CHAP. XX. *Medicated Wines.*

THE original intention of medicated wines was, that medicines, which were to be continued for a length of time, might be taken in the most familiar and agreeable form; by this means a course of remedies was complied with, notwithstanding the repugnance and aversion which the sick often manifest to those directly furnished from the shops; and hence the inferior sort of people had their medicated ales. Nevertheless, as vinous liquors excellently extract the virtues of several simples, and are not ill fitted for keeping, they have been employed as official menstrua also; and substances of the greatest efficacy are trusted in this form. As compounds of water and inflammable spirit, they take up such parts of vegetables and animals as are soluble in those liquors; though most of them abound at the same time with a mucilaginous or viscous substance, which renders them less effectual menstrua than purer mixtures of water and spirit. They contain likewise a subtle acid, which somewhat further obstructs their action on certain vegetable and animal matters; but enables them, in proportion to its quantity, to dissolve some bodies of the metallic kind, and thus impregnate themselves with the corroborating virtues of steel, the alterative and emetic powers of antimony, and the noxious qualities of lead.

To all the medicated wines, after they have been strained, you may add about one-twentieth their quantity of proof spirit, to preserve them from fermentation. They may be conveniently kept in the same kind of glass bottles that wines generally are for common uses, which should likewise be corked with the same care.

Wine of aloes. L.

Take of socotorine aloes, eight ounces; white canella, commonly called *winter's bark*, two ounces; Spanish white wine, six pints; proof-spirit, two pints. Powder the aloes and white canella separately; when mixed, pour on them the wine and spirit: afterwards digest for fourteen days, now and then shaking them; lastly, strain. It will not be amiss to mix white sand, cleansed from impurities, with the powder, in order to prevent the moistened aloes from getting into lumps.

Aloetic wine, or sacred tincture. E.

Take of socotorine aloes, one ounce; lesser cardamom seeds, ginger, each one dram; Spanish white wine, two pounds. Digest for seven days, stirring now and then, and afterwards strain.

This medicine has long been in great esteem, not only as a cathartic, but likewise as a stimulant; the wine dissolving all that part of the aloes in which these qualities reside, a portion only of the less active resinous matter being left. The aromatic ingredients are added to warm the medicine, and somewhat alleviate the ill flavour of the aloes: white canella, or cloves, are said, among numerous materials that have been tried, to answer this end the most successfully; hence the introduction of the former of these into the formula of the London college.

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The sacred tincture appears from long experience to be a medicine of excellent service in languid, phlegmatic habits, not only for cleansing the primæ viæ, but likewise for stimulating the solids, warming the habit, promoting or exciting the uterine purgations, and the hæmorrhoidal flux. The dose, as a purgative, is from one to two ounces or more. It may be introduced into the habit, so as to be productive of excellent effects, as an alterant, by giving it in small doses, at proper intervals: thus managed, it does not for a considerable time operate remarkably by stool; but at length proves purgative, and occasions a lax habit of much longer continuance than that produced by the other common cathartics.

Bitter wine. E.

Take of root of gentian, half an ounce; Peruvian bark, one ounce; Seville orange-peel, dried, two drams; white canella, one dram; proof spirit, four ounces; Spanish white wine, two pounds and a half. First pour on the spirit, after twenty-four hours add the wine; then macerate for three days, and strain.

This wine is intended to supply the place of the stomachic tincture, as it was formerly called. The wine is a menstruum fully capable of extracting the active powers of the different ingredients; and it supplies us with a very useful and elegant stomachic medicine, answering the purposes intended much better than the celebrated elixir of Van Helmont, and other unchemical and uncertain preparations, which had formerly a place in our pharmacopœias.

Wine of antimony. L.

Take of vitrified antimony, powdered, one ounce; Spanish white wine, a pint and an half. Digest for twelve days, frequently shaking the vessel, and filter the wine through paper.

Antimonial wine. E.

Take of glass of antimony, finely powdered, one ounce; Spanish white wine, fifteen ounces. Macerate for three days, stirring them now and then, and afterwards strain the liquor through paper.

However carefully the settling and decantation are performed, the filtration of the wine through paper appears to be necessary, lest some of the finer parts of the glass should chance to remain suspended in substance. It is not here, as in most other wines and tinctures, where the matter left undissolved by the menstruum is of little consequence; the antimonial glass, after the action of the wine, continues as virulent as ever, and capable of impregnating fresh parcels of the liquor as strongly as the first, and this, in appearance, inexhaustibly. After thirty repeated infusions, it has been found scarce sensibly diminished in weight.

The antimonial wine possesses the whole virtues of that mineral, and may be so dosed and managed as to perform all that can be effected by any antimonial preparation; with this advantage, that as the active part of the antimony is here already dissolved and rendered miscible with the animal fluids, its operation is more certain. Given from ten to fifty or sixty drops, it generally acts as an alterative and diaphoretic; in larger doses, as a diuretic and cathartic; while three or four drams prove for the most part violently emetic.

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It has been chiefly used with this last intention, in some maniacal and apoplectic cases; and hence it gained the name of *emetic wine*.

The quantity of the reguline part must, however, vary according to the proportions of the acid matter in different wines, and the operation of the medicine must be thereby less certain in degree; the vitrum is preferable to the crocus for making this preparation. See the different preparations of *Antimony*.

Wine of tartarized antimony. L.

- 411 Take of tartarized antimony, two scruples; boiling distilled water, two ounces; Spanish white wine, eight ounces; dissolve the tartarized antimony in the boiling distilled water, and add the wine.

Wine of antimonial tartar. E.

Take of antimonial tartar, commonly called *emetic tartar*, twenty four grains; and dissolve it in a pound of Spanish white wine.

Watery solutions of emetic tartar, on standing, precipitate a part which is left completely in a saline state; by this means, and especially if the solution be not shaken before using it, the dose of that medicine is somewhat ambiguous: in the above formula, the acid matter of the wine increases the saline state of the antimony, and therefore its solubility, whereby the operation of the medicine is more certain, and in many cases more powerful. From the certainty of its effects, this preparation might be very convenient in large hospitals or armies, where great numbers of the sick, and inaccurate nursing, frequently occasion an uncertain or dangerous practice.

In the formula employed by the Edinburgh college, each ounce of the wine contains two grains of the tartarized antimony; but in that of the London college, each ounce of the menstruum contains four grains: hence, while an ounce of the one may be employed for exciting full vomiting, the same quantity of the other would be too strong a dose. It is much to be regretted, that, in articles of this active nature, the proportions employed by the two colleges should differ so considerably: and it would perhaps have been better, had the London college adopted the proportions employed by that of Edinburgh, as they have followed them in adopting this formula.

Wine of iron. L.

- 412 Take of filings of iron, four ounces; Spanish white wine, four pints. Digest for a month, often shaking the vessel, and then strain.

This formula of the London pharmacopœia is now not only simplified, but improved, when compared with their former *vinum chalybeatum*: for the cinnamon and other articles which were then conjoined with the iron, were certainly rather prejudicial than otherwise; but at the same time, Rhenish wine, formerly employed, is perhaps to be considered as a better menstruum than the Spanish wine now directed. It may still, however, be justly considered as a good chalybeate; and we think the Edinburgh college have done wrong in rejecting the formula from their pharmacopœia.

By the London college it was formerly prepared by maceration, without heat; now, however, they direct digestion for the space of a month. Some have ob-

jected to the use of heat, that it impregnated the wine more strongly with the metal, and thus rendered it more unpleasant to the taste: but if this was the only inconvenience, the remedy would be easy, diluting it with more wine. Heat has another effect, much less desirable, and which art cannot remedy; making a disagreeable alteration in the quality of the wine itself: hence it is necessary that it should be very moderate.

Steel-wine is a very useful preparation of this metal, and frequently exhibited in chlorotic and other indispositions where chalybeates are proper. Boerhaave recommends it as one of the noblest medicines he was acquainted with for promoting that power in the body by which blood is made, when weakened by a bare debility of the over-relaxed solids, and an indolent, cold, aqueous indisposition of the juices: for in this case, says he, no virtue of any vegetable or animal substance, no diet, nor regimen, can effect that which is effected by iron: but it proves hurtful where the vital powers are already too strong, whether this proceeds from the fluids or the solids. The dose is from a dram to half an ounce; which may be repeated two or three times a day.

Some direct solutions of iron, made in wine or other vegetable acids, to be evaporated to the consistence of an extract, under the title of *extractum martis*. These preparations have no advantage, in point of virtue, above the common chalybeates: though in some forms, that of pills in particular, they may be rather more commodiously exhibited than most of the officinal chalybeates of equal efficacy. They may be made into pills by themselves; and are tenacious enough to reduce other substances into that form.

Wine of ipecacuanha. L.

- Take of the root of ipecacuanha, bruised, two ounces; Spanish white wine, two pints. Digest for ten days, and strain. 413

Wine, or tincture, of ipecacuanha. E.

Take of ipecacuanha, in powder, one ounce; Spanish white wine, fifteen ounces. After three days maceration, let the tincture be filtrated for use.

Both these wines are very mild and safe emetics, and equally serviceable in dysenteries also with the ipecacuanha in substance; this root yielding nearly all its virtues to the Spanish white wine here ordered, as it does a good share of them even to aqueous liquors. The common dose is an ounce, more or less, according to the age and strength of the patient. The college of Edinburgh added formerly a scruple of cochineal, which imparts a fine red colour to the liquor: this article is now omitted, on a complaint that the red colour of the matters evacuated sometimes alarmed the patient, as if it proceeded from a discharge of blood.

Wine of millepeda. E.

Take of live millepeda, bruised, one ounce; Rhenish wine, eight ounces. Infuse them together for twelve hours, and afterwards press the liquor through a strainer.

This wine has been commended as an admirable cleanser of all the viscera, yielding to nothing in the jaundice and obstructions of the kidneys or urinary passages, 414

passages, of excellent service in almost all chronicl distempers, even in serofulous and strumous swellings, and in defluxions of rheum upon the eyes. But those who expected these extraordinary virtues from it have often been deceived; and at present there are few who have any great dependence on it; and hence it is omitted by the London college, probably without any loss. It is directed to be given from half an ounce to two ounces.

Wine of rhubarb. L.

Take of sliced rhubarb, two ounces and an half; lesser cardamom-seeds, bruised and husked, half an ounce; saffron, two drams; Spanish white wine, two pints; proof-spirit, eight ounces. Digest for ten days, and strain.

Rhubarb-wine. E.

Take of rhubarb, two ounces; white canella, one dram; proof-spirit, two ounces; Spanish white wine, fifteen ounces. Macerate for seven days, and strain.

By assisting the solvent power of the menstruum, the proof-spirit in the above formulæ is a very useful addition. This is a warm, cordial, laxative medicine. It is used chiefly in weakness of the stomach and bowels, and some kinds of loosenesses, for evacuating the offending matter, and strengthening the tone of the viscera. It may be given from half a spoonful to three or four spoonfuls or more, according to the circumstances of the disorder, and the purposes it is intended to answer.

Tobacco-wine.

Take of the dried leaves of the best Virginian tobacco, one ounce; Spanish white wine, one pound. Macerate for four days, and then strain the liquor.

We have already, under the article NICOTIANA, offered some observations on its late introduction into practice by Dr Fowler, as a very useful remedy in the cure of dropsies and dysurics. From his treatise on that subject the present formula is taken; and we may observe, that while in practice we have frequently experienced from the tobacco those good effects for which Dr Fowler recommends it, we are inclined to give the present formula the preference to every other which he has proposed. It seems to extract more fully the active principles of the tobacco than either water or spirit taken separately. For further observations on the medical virtues of tobacco, see the article NICOTIANA.

Squill-wine. Suc.

Take of dried squill, sliced, one ounce; ginger, one dram; French white wine, two pounds. Macerate for three days, and then strain.

By the wine employed as a menstruum, the active properties of the squills may be readily extracted; and in some cases at least the present formula may justly be considered as intitled to a preference over either the vinegar or oxymel of squills, which have a place in our pharmacopœias. The ginger here added to the squills operates as an useful corrigent; and on this account the present formula is preferable to the squill-wine of some other pharmacopœias, where the squills alone are used: For it is chiefly used in those cases where it is

intended that the squills should exert their effects, not on the alimentary canal, but on the kidneys or other excretories.

Zedoary wine. Dan.

Take of the root of zedoary, gently bruised, two pounds; spirit of wine, eight pounds. Let them be macerated for a month; then add spring water, eight pounds. Distil from thence twelve pounds.

Though this formula has the name of a wine, yet it is in reality a distilled spirit, nothing from the zedoary but a portion of its essential oil being united with the ardent spirit: and we are inclined to think, that the active powers of this article, both as depending on aroma and bitterness, might be better obtained by a simple infusion in Spanish white wine.

CHAP. XXI. *Tinctures.*

RECTIFIED spirit of wine is the direct menstruum of the resins and essential oils of vegetables, and totally extracts these active principles from sundry vegetable matters, which yield them to water either not at all, or only in part. It dissolves likewise the sweet saccharine matter of vegetables; and generally those parts of animal bodies in which their peculiar smell and taste reside.

The virtues of many vegetables are extracted almost equally by water and rectified spirit; but in the watery and spirituous tinctures of them there is this difference, that the active parts in the watery extractions are blended with a large proportion of inert gummy matter, on which their solubility in this menstruum in a great measure depends, while rectified spirit extracts them almost pure from gum. Hence, when the spirituous tinctures are mixed with watery liquors, a part of what the spirit had taken up from the subject generally separates and subsides, on account of its having been freed from that matter which, being blended with it in the original vegetable, made it soluble in water. This, however, is not universal; for the active parts of some vegetables, when extracted by rectified spirit, are not precipitated by water, being almost equally soluble in both menstua.

Rectified spirit may be tinged by vegetables of all colours except blue: the leaves of plants in general, which give out but little of their natural colour to watery liquors, communicate to spirit the whole of their green tincture, which for the most part proves elegant, though not very durable.

Fixed alkaline salts deepen the colour of spirituous tinctures; and hence they have been supposed to promote the dissolving power of the menstruum, though this does not appear from experience: in the trials that have been made to determine this affair, no more was found to be taken up in the deep-coloured tinctures than in the paler ones, and often not so much: if the alkali be added after the extraction of the tincture, it will heighten the colour as much as when mixed with the ingredients at first. Nor does the addition of these salts make tinctures useless only, but likewise prejudicial, as they in general injure the flavour of aromatics, and superadd a quality, sometimes contrary to the intention of the medicine. Volatile alkaline salts, in many cases, promote the action of the spirits. A-

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cids generally weaken it; unless when the acid has been previously combined with the vinous spirit into a compound of new qualities, called *dulcified spirit*.

Tincture of wormwood. E.

- 420 Take of the flowering tops of wormwood, properly dried, four ounces; rectified spirit of wine, two pounds. Macerate for two days; then press out the spirit, and pour it on two ounces of wormwood. Macerate again for four days; then press the tincture through a cloth, and afterwards strain it through paper.

The aromatic parts of wormwood are more especially found in the flowering tops, and its bitterness in the leaves: but as the latter are replete with a mucilaginous matter, which might impede the action of the menstruum on the aromatic parts in this very elegant formula the flowering tops are infused first, and their tincture made to extract the bitter parts of the leaves and stalks. This preparation may therefore be considered as containing the whole virtues of the plant.

In the tincture of wormwood we have one of the strongest of the vegetable bitters. It is sometimes used as an anthelmintic, and still more frequently in stomach ailments: But to most people it is a very disagreeable medicine.

Tincture of aloes. L.

- 421 Take of fœcotorine aloes, powdered, half an ounce; extract of liquorice, an ounce and an half; distilled water, proof-spirit, of each eight ounces. Digest in a sand-bath, now and then shaking the vessel, until the extract be dissolved, and then strain.

In this simple tincture all the active parts of the aloes, whether of a gummy or resinous nature, are suspended in the menstruum. The extract of liquorice serves both to promote the suspension and to cover the taste of the aloes; and in these cases where we wish for the operation of the aloes alone, without the aid either of an adjuvans or corrigens, this is perhaps one of the best formulæ under which aloes can be exhibited in a fluid state.

Compound tincture of aloes. L.

- 422 Take of tincture of myrrh, two pints; saffron, fœcotorine aloes, of each three ounces. Digest for eight days, and strain.

Elixir of aloes, commonly called elixir proprietatis. E.

Take of myrrh in powder, two ounces; fœcotorine aloes, an ounce and a half; English saffron, one ounce; rectified spirit of wine, proof-spirit, of each one pound. Digest the myrrh with the spirit for the space of four days; then add the aloes in powder, and the saffron; continue the digestion for two days longer, suffer the feces to subside, and pour off the clear elixir.

These two formulæ, though the mode of preparation be somewhat varied, do not materially differ from each other; and both may be considered as being the *elixir proprietatis* of Paracelsus, improved with regard to the manner of preparation. The myrrh, saffron, and aloes, have been usually directed to be digested in the spirit together: by this method, the menstruum soon

loads itself with the latter, so as scarcely to take up any of the myrrh; while a tincture, extracted first from the myrrh, readily dissolves a large quantity of the others. The alkaline salt, commonly ordered in these preparations with a view to promote the dissolution of the myrrh, we have already observed to be useless; and accordingly it is now omitted. Instead of employing the rectified spirit alone, the Edinburgh college have used an equal portion of proof spirit, which is not only a more complete menstruum, but also renders the medicine less heating.

This medicine is highly recommended, and not undeservedly, as a warm stimulant and aperient. It strengthens the stomach and other viscera, cleanses the first passages from tenacious phlegm, and promotes the natural secretions in general. Its continued use has frequently done much service in cachectic and stercoraceous cases, uterine obstructions, and other similar disorders; particularly in cold pale phlegmatic habits. Where the patient is of a hot bilious constitution and florid complexion, this warm stimulating medicine is less proper, and sometimes prejudicial. The dose may be from twenty drops to a tea-spoonful or more, two or three times a-day, according to the purposes which it is intended to answer.

Vitriolic elixir of aloes, or proprietatis. E.

Take of myrrh, fœcotorine aloes, each an ounce and a half; English saffron, one ounce; dulcified spirit of vitriol, one pound. Digest the myrrh with the spirit for four days in a close vessel; then add the saffron and aloes. Digest again four days; and when the feces have subsided pour off the elixir.

The Edinburgh college have reformed this preparation considerably; and especially by directing the myrrh to be digested first, for the same reasons as were observed on the preceding article. Here the dulcified spirit of vitriol is very judiciously substituted for the spirit of sulphur, ordered in other books of pharmacy to be added to the foregoing preparation; for that strong acid precipitates from the liquor great part of what it had before taken up from the other ingredients; whereas, when the acid is previously combined with the vinous spirit, and thereby dulcified, as it is called, it does not impede its dissolving power. This elixir possesses the general virtues of the preceding, and is, in virtue of the menstruum, preferred to it in hot constitutions and weaknesses of the stomach.

Aromatic tincture. E.

Take of cinnamon, six drams; lesser cardamom seeds, one ounce; garden-angelica root, three drams; long pepper, two drams; proof spirit, two pounds and an half. Macerate for seven days, and filter the tincture.

This preparation is improved from the preceding editions by the omission of some articles, either superfluous or foreign to the intention; galangal, gentian, zedoary, bay-berries, and calamus aromaticus. As now reformed, it is a sufficiently elegant warm aromatic.

This very warm aromatic is too hot to be given without dilution. A tea spoonful or two may be taken in wine or any other convenient vehicle, in languors,

weakness of the stomach, flatulencies, and other similar complaints; and in these cases it is often employed with advantage.

Tincture of asafetida. L.

- 425 Take of asafetida, four ounces; rectified spirit of wine, two pints. Digest with a gentle heat for six days, and strain.

Fetid tincture. E.

Take of asafetida, two ounces; vinous spirit of sal ammoniac one pound. Macerate for six days in a close shut vessel, and strain.

Of these two formulæ, the last is perhaps most generally useful: The vinous spirit of sal ammoniac is not only a more powerful menstruum than the rectified spirit of wine, but also coincides with the general virtues of the remedy.

This tincture possesses the virtues of the asafetida itself; and may be given from ten drops to fifty or sixty. It was first proposed to be made with proof-spirit; this dissolves more of the asafetida than a rectified one; but the tincture proves turbid; and therefore rectified spirit, which extracts a transparent one, is very justly preferred where ardent spirit is to be employed: and with this menstruum we can at least exhibit the asafetida in a liquid form to a greater extent.

Tincture of balsam of Peru. L.

- 426 Take of balsam of Peru, four ounces; rectified spirit of wine, one pint. Digest until the balsam be dissolved.

The whole of the Peruvian balsam is dissolved by spirit of wine: this therefore may be considered as a good method of freeing it from its impurities; while at the same time it is thus reduced to a state under which it may be readily exhibited: but at present it is very little employed, unless in composition, either under this or any other form.

Tincture of balsam of Tolu.

- 427 Take of balsam of Tolu, one ounce and an half; rectified spirit of wine, one pint. Digest until the balsam be dissolved, and strain. *L.*

Take of balsam of Tolu, an ounce and an half; rectified spirit of wine, one pound. Digest until the balsam be dissolved, and then strain the tincture. *E.*

This solution of balsam of Tolu possesses all the virtues of the balsam itself. It may be taken internally, with the several intentions for which that valuable balsam is proper, to the quantity of a tea-spoonful or two, in any convenient vehicle. Mixed with the plain syrup of sugar, it forms an elegant balsamic syrup.

Compound tincture of benzoin. L.

- 428 Take of benzoin, three ounces; storax strained, two ounces; balsam of Tolu, one ounce; socotorine aloes, half an ounce; rectified spirit of wine, two pints. Digest with a gentle heat for three days, and strain.

Traumatic balsam. E.

Take of benzoin, three ounces; balsam of Peru, two ounces; hepatic aloes, half an ounce; rectified spi-

rit of wine, two pounds. Digest them in a sand heat for the space of ten days, and then strain the balsam.

Although the London college have changed the name of this composition, yet they have made very little alteration on the formula which, in their last edition, had the name of *Traumatic balsam*; a name which it still retains in the Edinburgh pharmacopœia; and both may be considered as elegant contractions of some very complicated compositions, which were celebrated under different names; such as Baume de Commandeur, Wade's balsam, Friar's balsam, Jesuit's drops, &c. These, in general, consisted of a confused var-rago of discordant substances. They, however, derived considerable activity from the benzoin and aloes; and every thing to be expected from them may readily be obtained from the present formulæ.

The compound tincture of benzoin, or traumatic balsam, stands highly recommended, externally, for cleansing and healing wounds and ulcers, for dissolving cold tumors, allaying gouty, rheumatic, and other old pains and aches; and likewise internally, for warming and strengthening the stomach and intestines, expelling flatulencies, and relieving colic complaints. Outwardly, it is applied cold on the part with a feather; inwardly, a few drops are taken at a time, in wine or any other convenient vehicle.

There is, however, reason to think that its virtues have been considerably over-rated; and at present it is much less employed than formerly, recourse being chiefly had to it in cases of recent wounds, with the view of stopping hæmorrhagies, and of promoting healing by the first intention, as it is called.

Tincture of the Spanish fly.

Take of bruised cantharides, two drams; cochineal, powdered, half a dram; proof-spirit, one pint and an half. Digest for eight days, and strain. *L.*

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Take of cantharides, one dram; proof spirit, one pound. Digest for four days, and strain through paper. *E.*

These tinctures possess the whole virtues of the fly, and are the only preparations of it designed for internal use: tinctures being by far the most commodious and safe form for the exhibition of this active drug. The two tinctures are scarcely different in virtue from each other. The cochineal is used only as a colouring ingredient: the gum-guaiacum, camphor, and essential oil of juniper-berries, which were formerly added, however well adapted to the intentions of cure, could be of little consequence in a medicine limited to so small a dose. If any additional substances should be thought requisite for promoting the effect of the cantharides, whether as a diuretic, as a detergent in ulcerations of the urinary passages, or as a specific restraining of seminal gleans and the fluor albus, they are more advantageously joined extemporaneously to the tincture, or interposed by themselves at proper intervals. The usual dose of these tinctures is from ten to twenty drops; which may be taken in a glass of water, or any other more agreeable liquor, twice a day; and increased by two or three drops at a time, according to the effect.

The tincture of cantharides has of late been highly celebrated as a successful remedy in diabetic cases; and

and in some instances of this kind, its use has been pushed to a very considerable extent, without giving rise to any stragurious affections: But we have not found it productive of a change for the better in any of those cases of diabetes in which we have tried it.

Tincture of cardamom.

- 430 Take of lesser cardamom seeds, husked and bruised, three ounces; proof-spirit, two pints. Digest for eight days, and strain. *L.*

Take of lesser cardamom seeds, six ounces; proof-spirit, two pounds and a half. Macerate for eight days, and strain through paper. *E.*

Tincture of cardamom has been in use for a considerable time. It is a pleasant, warm cordial; and may be taken, along with any proper vehicle, from a dram to a spoonful or two.

Compound tincture of cardamom. *L.*

- 431 Take of lesser cardamom seeds, husked, caraway-seeds, cochineal, each, powdered, two drams; cinnamon, bruised, half an ounce; raisins, stoned, four ounces; proof-spirit, two pints. Digest for fourteen days, and strain.

This tincture contains so small a proportion of cardamoms as to be hardly intitled to derive its name from that article; and from the large proportion of raisins which it contains, the influence of the aromatics must be almost entirely prevented, while, at the same time, from these it cannot be supposed to obtain any active impregnation.

Tincture of cascarilla. *L.*

- 432 Take of the bark of cascarilla, powdered, four ounces; proof-spirit, two pints. Digest with a gentle heat for eight days, and strain.

Proof-spirit readily extracts the active powers of the cascarilla; and the tincture may be employed to answer most of those purposes for which the bark itself is recommended: But in the cure of intermittents, it in general requires to be exhibited in substance.

Tincture of castor.

- 433 Take of Russia castor, powdered, two ounces; proof-spirit, two pints. Digest for ten days, and strain. *L.*

Take of Russia castor, an ounce and a half; rectified spirit of wine, one pound; digest them with a gentle heat for six days, and afterwards strain off the liquor. *E.*

An alkaline salt was formerly added in this last prescription, which is here judiciously rejected, as being at least an useless, if not a prejudicial, ingredient. It has been disputed, whether a weak or rectified spirit, and whether cold or warm digestion, are preferable for making this tincture. To determine this point, the following experiment has been mentioned. "Some fine Siberia castor having been infused in good French brandy, without heat, for twenty days, the tincture proved very weak: On the same individual castor (the magma or residuum of the former tincture) the same quantity of rectified spirit was poured as before of brandy; and after a few hours warm digestion, a tincture was extracted much stronger than the other." But this experiment is not satisfactory: the effects of

the two menstrua, and of heat, having been respectively compared in very different circumstances.

From other trials, it appears that castor, macerated without heat, gives out its finer and most grateful parts to either spirit, but most perfectly to the rectified. That heat enables both menstrua to extract greatest part of its grosser, and more nauseous matter; and proof-spirit extracts this last more readily than rectified.

The tincture of castor is recommended in most kinds of nervous complaints and hysteric disorders: In the latter it sometimes does service, though many have complained of its proving ineffectual. The dose is from twenty drops to forty, fifty, or more.

Compound tincture of castor. *E.*

- Take of Russia castor, one ounce; asafœtida, half an ounce; vinous spirit of sal ammeniac, one pound. Digest for six days in a close stopped phial, frequently shaking the vessel; and then strain the tincture. 434

This composition is a medicine of real efficacy, particularly in hysterical disorders, and the several symptoms which accompany them. The spirit here used is an excellent menstruum, both for the castor and the asafœtida, and greatly adds to their virtues.

Tincture of catechu. *L.*

- Take of catechu, three ounces; cinnamon, bruised, two ounces; proof-spirit, two pints. Digest for three days, and strain. 435

Japonic tincture. *E.*

- Take of Japan earth, three ounces; cinnamon, two ounces; proof-spirit, two pounds and a half. After digestion for eight days, let the tincture be passed through a strainer.

A tincture of this kind, with the addition of Peruvian bark, ambergris, and musk, to the ingredients above directed, was formerly kept in the shops. The tincture here received is preferable for general use: where any other ingredients are required, tinctures of them may be occasionally mixed with this in extemporaneous prescription. The cinnamon is a very useful addition to the catechu, not only as it warms the stomach, &c. but likewise as it improves the roughness and astringency of the other.

The tincture is of service in all kinds of defluxions, catarrhs, loosenesses, uterine fluors, and other disorders, where mild astringent medicines are indicated. Two or three tea-spoonfuls may be taken every now and then in red wine, or any other proper vehicle.

Tincture of cinnamon.

- Take of cinnamon, bruised, one ounce and an half; proof-spirit, one pint. Digest for ten days, and strain. *L.* 436

Take of cinnamon, three ounces; proof-spirit, two pounds and a half. Macerate for eight days, and strain. *E.*

The tincture of cinnamon possesses the restringent virtues of the cinnamon, as well as its aromatic cordial ones; and in this respect it differs from the distilled waters of that spice.

Compound

Compound tincture of cinnamon. L.

Take of cinnamon, bruised, six drams; lesser cardamom-seeds, husked, three drams; long pepper, ginger, of each, in powder, two drams; proof-spirit, two pints. Digest for eight days and strain.

From the different articles which this tincture contains, it must necessarily be of a more hot and fiery nature than the former, though much less strongly impregnated with the cinnamon.

Tincture of colomba. L.

Take of colomba-root, powdered, two ounces and an half; proof-spirit, two pints. Digest for eight days, and strain.

The colomba readily yields its active qualities to the menstruum here employed; and accordingly, under this form, it may be advantageously employed against bilious vomitings, and those different stomach ailments, in which the colomba has been found useful; but where there does not occur some objection to its use in substance, that form is in general preferable to the tincture, which is now for the first time introduced into the London pharmacopœia.

Tincture of orange peel. L.

Take of the fresh exterior peel of Seville oranges, three ounces; proof-spirit, two pints. Digest for three days, and strain.

By this menstruum, both the bitter quality of the orange skins, and likewise their peculiar essential oil, are extracted: hence it may be employed for any purpose in medicine which these are capable of answering. It is, however, but rarely used; and, as well as the former, has now only for the first time a place in the London pharmacopœia.

Tincture of Peruvian bark. L.

Take of Peruvian bark, powdered, four ounces; proof-spirit, two pints. Digest with a gentle heat for eight days, and strain. L.

Take of Peruvian bark, four ounces; proof-spirit, two pounds and a half. Digest for ten days, and strain. E.

A medicine of this kind has been for a long time pretty much in esteem, and usually kept in the shops, though but lately received into the pharmacopœias. Some have employed highly-rectified spirit of wine as a menstruum; which they have taken care fully to saturate, by digestion on a large quantity of the bark. Others have thought of assisting the action of the spirit by the addition of a little fixed alkaline salt, which does not however appear to be of any advantage; and others have given the preference to the vitriolic acid, which was supposed, by giving a greater consistence to the spirit, to enable it to sustain more than it would be capable of doing by itself; at the same time that the acid improves the medicine by increasing the roughness of the bark. This last tincture, and that made with rectified spirit, have their advantages; though, for general use, that above directed is the most convenient of any, the proof-spirit extracting nearly all the virtues of the bark. It may be given from a teaspoonful to half an ounce, or in

ounce, according to the different purposes it is intended to answer.

Compound tincture of Peruvian bark. L.

Take of Peruvian bark, powdered, two ounces; exterior peel of Seville oranges, dried, one ounce and an half; Virginian snake root, bruised, three drams; saffron, one dram; cochineal, powdered, two scruples; proof-spirit, twenty ounces. Digest for fourteen days, and strain.

This has been for a considerable time celebrated under the title of *Huxham's tincture of bark*.

The substances here joined to the bark, in some cases, promote its efficacy in the cure of intermittents, and not unfrequently are absolutely necessary. In some ill habits, particularly where the viscera and abdominal glands are obstructed, the bark, by itself, proves unsuccessful, if not injurious; while given in conjunction with stimulating stomachics and deobstruents, it more rarely fails of the due effect. Orange-peel and Virginian snake-root are among the best additions for this purpose; to which it is thought by some necessary to join chalybeate medicines also.

As a corroborant and stomachic, it is given in doses of two or three drams; but when employed for the cure of intermittents, it must be taken to a greater extent. For this purpose, however, it is rarely employed, unless with those who are averse to the use of the bark in substance, or whose stomachs will not retain it under that form.

Tincture of saffron. E.

Take of English saffron, one ounce; proof-spirit, fifteen ounces. After digesting them for five days, let the tincture be strained through paper.

This tincture is similar in virtue to the saffron wine. A spirituous menstruum is here preferred to the wine, as a tincture drawn with the former retains its elegant colour longer, and is not apt to deposit in keeping any part of what it had taken up from the saffron. The shops have been accustomed to employ treacle water as a menstruum for saffron, with a view to the promoting its efficacy with the intention of operating as an alexipharmac; but the acid in that compound water soon destroys the colour of the tincture.

Tincture of muriatic iron. L.

Take of the rust of iron, half a pound; muriatic acid, three pounds; rectified spirit of wine, three pints. Pour the muriatic acid on the rust of iron in a glass vessel; and shake the mixture now and then during three days. Set it by that the feces may subside; then pour off the liquor: evaporate this to one pint, and, when cold, add to it the vinous spirit.

Tincture of iron. E.

Take of the scales of iron, purified and powdered, three ounces; muriatic acid, as much as is sufficient to dissolve the powder. Dissolve with a gentle heat, and the powder being dissolved, add of rectified spirit of wine as much as will make up of the whole liquor two pounds and a half.

Of these two formulæ, that of the Edinburgh college is, in our opinion, in several respects inferior to the

the preference. The scales are much fitter for giving a proper solution than the rust. The strength of the muriatic acid is so variable, that the quantity is left to the judgment of the operator. If the acid be superabundant, the solution is of a green colour; if it be fully saturated with the iron, it is more or less of a reddish or yellow colour; and this serves as a pretty accurate criterion. As the muriatic acid combines less intimately with rectified spirit than any of the fossil acids, so the after-process of dulcification scarcely, if at all, impairs the solvent power of the acid; though, when the dulcification happens to be more than usually complete, a small quantity of ferruginous matter is sometimes precipitated on adding the rectified spirit to the solution. But as the rectified spirit increases the volatility of the acid, so if it was added at first, we should lose much more of the menstruum by the heat employed during the digestion. When this tincture is well prepared, it is of a yellowish-red colour; if the acid be superabundant, it is more or less of a greenish hue; and if the rectified spirit has been impregnated with the astrigent matter of oak cakes, it assumes an inky colour.

All the tinctures of iron are no other than real solutions of the metal made in acids, and combined with vinous spirits. The tinctures here directed differ from each other only in strength, the acid being the same in both. In our former pharmacopœias, there was a tincture from the matter which remains after the sublimation of the martial flowers; which, though it appears to be a good one, is now expunged as superfluous. Some have recommended dulcified spirit of nitre as a menstruum; but though this readily dissolves the metal, it does not keep it suspended. The marine is the only acid that can be employed for this purpose.

These tinctures are greatly preferable to the calces or croci of iron, as being not only more speedy, but likewise more certain in their operation. The latter, in some cases, pass off through the intestinal tube with little effect; while the tinctures scarce ever fail. From ten to twenty drops of either of the tinctures may be taken two or three times a-day, in any proper vehicle; though it is seldom advisable to extend the dose of any tinctures of iron so far as the last of these quantities, especially with the tincture in spirit of salt, which is exceedingly strong of the iron.

Tincture of foot. E.

- 444 Take of shining wood-foot, one ounce; asafœtida, half an ounce; rectified spirit of wine, proof-spirit, of each half a pound. Digest for six days, and strain.

The proof-spirit is not liable to any objection here, as giving a turbid tincture; for when foot is added, whatever spirit be employed, the tincture will not prove transparent. Fuller, in his Pharmacopœia Domestica, has a medicine under the title of *hysteric tincture*, similar to this, only with a little myrrh, which is no very material addition to asafœtida and foot. These medicines are found serviceable, not only in hysterical cases, but likewise in other nervous disorders. They may be given from a tea-spoonful to a table-spoonful twice a-day.

This medicine has by some been thought serviceable

in obstructions of the menses; but its activity may be considered as depending much more on the asafœtida than on the foot.

Tincture of galbanum. L.

- Take of galbanum, cut into small pieces, two ounces; proof-spirit, two pints. Digest with a gentle heat for eight days, and strain.

445

This tincture is now for the first time introduced by the London college, and may be usefully employed for answering several purposes in medicine. Galbanum is one of the strongest of the fetid gums; and although less active, yet much less disagreeable than asafœtida: and under the form of tincture it may be successfully employed in cases of flatulence and hysteria, where its effects are immediately required, particularly with those who cannot bear asafœtida.

Compound tincture of gentian. L.

- Take of gentian root, sliced and bruised, two ounces; exterior dried peel of Seville oranges, one ounce; lesser cardamom seeds, husked and bruised, half an ounce; proof-spirit, two pints. Digest for eight days, and strain.

446

Bitter tincture, or stomachic elixir. E.

- Take of gentian-root, two ounces; Seville orange-peel, dried, one ounce; white canella, half an ounce; cochineal, half a dram; proof-spirit, two pounds and a half. Macerate for four days, and strain through paper.

These are very elegant spirituous bitters. As the preparations are designed for keeping, lemon-peel, an excellent ingredient in the watery bitter infusions, has, on account of the perishableness of its flavour, no place in these. The aromatics are here a very commodious ingredient, as in this spirituous menstruum they are free from the inconvenience with which they are attended in other liquors, of rendering them untransparent.

Elixir of guaiacum. E.

- Take of gum-guaiacum, one pound; balsam of Peru, three drams; rectified spirit of wine, two pounds and a half. Digest for ten days, and strain.

447

This tincture may be considered as nearly agreeing in medical virtues with the two following. It is, however, less in use; but it may be employed with advantage in those cases where an objection occurs to the menstruum used in forming the others.

Tincture of gum-guaiacum. L.

- Take of gum-guaiacum, four ounces; compound spirit of ammonia, a pint and a half. Digest for three days, and strain.

448

Volatile elixir of guaiacum. E.

- Take of gum-guaiacum, four ounces; balsam of Peru, two drams; distilled oil of saffras, half a dram; vinous spirit of sal ammoniac, a pound and an half. Macerate for six days in a close vessel, and strain.

In the last of these formulæ, the vinous spirit of sal ammoniac is less acrimonious than the menstruum directed by the London college; and the balsam of Peru, and distilled oil of saffras, are useful additions,

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by increasing the permanence of its operation as a general stimulant, or more particularly as a diaphoretic.

These are very elegant and efficacious tinctures; the volatile spirit excellently dissolving the gum, and at the same time promoting its medicinal virtue. In rheumatic cases, a tea or even table spoonful, taken every morning and evening in any convenient vehicle, particularly in milk, has proved of singular service.

Tincture of black hellebore. L.

49 Take of black hellebore root, in coarse powder, four ounces; cochineal, powdered, two scruples; proof-spirit, two pints. Digest with a gentle heat for eight days, and strain.

Tincture of melampodium, or black hellebore. E.

Take of black hellebore root, four ounces; cochineal, half a dram; proof-spirit two pounds and a half. Digest them together for eight days, and afterwards filter the tincture through paper.

This is perhaps the best preparation of hellebore, when designed for an alterative, the menstruum here employed extracting the whole of its virtues. It has been found, from experience, particularly serviceable in uterine obstructions; in sanguine constitutions, where chalybeates are hurtful, it has been said that it seldom fails of exciting the menstrual evacuations, and removing the ill consequences of their suppression. So great, according to some, is the power of this medicine, that wherever, from an ill conformation of the parts, or other causes, the expected discharge does not succeed on the use of it, the blood, as Dr Mead has observed, is so forcibly propelled, as to make its way through other passages. A tea spoonful of the tincture may be taken twice in a day in warm water or any other convenient vehicle.

The college of Edinburgh had formerly a tincture of this root with wine. Proof spirit is undoubtedly preferable, both as a menstruum, and as being better fitted for keeping.

Tincture of jalap.

50 Take of powdered jalap root, eight ounces; proof-spirit, two pints. Digest with a gentle heat for eight days, and strain. *L.*

Take of jalap, in coarse powder, three ounces; proof-spirit, fifteen ounces. Digest them for eight days, and strain the tincture. *E.*

Rectified spirit of wine was formerly ordered for the preparation of this tincture; but rectified spirit dissolving little more than the pure resinous parts of the jalap, rendered the use of the medicine somewhat less commodious than that of the tincture prepared with proof-spirit. Most of the tinctures made in rectified spirit, diluted with water, so as to be fit for taking, form a turbid white mixture. Many of them are safely taken in this form, without any further addition: but the cathartic ones are never to be ventured on without an a mixture of syrup or mucilage to keep the resin united with the liquor; for if it separates in its pure undivided state, it never fails to produce violent gripes.

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Some have preferred to the tinctures of jalap, a Preparation solution in spirit of wine of a known quantity of the resin extracted from the root; and observe, that this solution is more certain in strength than any tincture that can be drawn from the root directly. For, as the purgative virtue of jalap resides in its resin, and as all jalap appears from experiment not to be equally resinous, some sorts yielding five, and others not three, ounces of resin from sixteen; it follows, that although the root be always taken in the same proportion to the menstruum, and the menstruum always exactly of the same strength, it may, nevertheless, according to the degree of goodness of the jalap, be impregnated with different quantities of resin, and consequently prove different in degree of efficacy. Though this objection against the tincture does not reach so far as some seem to suppose, it certainly behoves the apothecary to be careful in the choice of the root. The inferior sorts may be employed for making resin of jalap, which they yield in as great perfection, though not in so large quantity, as the best. Neumann thinks even the worm-eaten jalap as good for that purpose as any other.

Tincture of gum-kino. E.

Take of gum-kino, two ounces; proof-spirit, a pound and an half. Digest eight days, and strain. 451

The substance called *gum-kino* seems to be really a gum-resin; on which account proof-spirit is the most proper menstruum. This preparation must therefore possess the virtues of the substance; and it is perhaps one of the best forms under which it can be exhibited in obstinate diarrhoeas, and in cases of lenteria: but in hemorrhagies, it is in general proper to exhibit it either in substance or diffused; yet we cannot help thinking that the want of this tincture is an omission in the London pharmacopœia.

Compound tincture of lavender. L.

Take of spirit of lavender, three pints; rosemary, one pint; cinnamon bruised, nutmegs bruised, of each half an ounce; red sanders, one ounce. Digest for ten days, and strain. 452

Compound spirit of lavender. E.

Take of simple spirit of lavender, three pounds; simple spirit of rosemary, one pound; cinnamon, one ounce; cloves, two drams; nutmeg, half an ounce; red sanders, three drams. Macerate seven days, and strain.

These two compositions, although varying a little from each other, both with respect to their ingredients and names, may yet be considered as precisely the same. Although the London college, in the present edition of their pharmacopœia, have made many useful alterations with respect to names, yet the propriety of the change here adopted may perhaps be doubted: For it cannot with justice be styled a tincture of lavender, when the distilled spirit of that plant is employed only as a menstruum. If, therefore, it seemed necessary to refer it to the head of tinctures, it ought to have been denominated from the cinnamon or nutmegs; but since the activity of this article very much depends on the spirit of lavender,

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vender, the old name is in our opinion justly preferable to the new one.

The red Saunders is of no farther use in these compositions than as a colouring ingredient. If a yellow spirit was liked, the yellow Saunders would be an excellent article, as it not only communicates a fine colour, but likewise a considerable share of medicinal virtue. A spirit distilled from the flowers of lavender and sage, in due proportion, and digested in the cold for a little time with some cinnamon, nutmegs, and yellow Saunders, proves a very elegant and grateful one. Where essential oils are employed, particular care must be had in the choice of them; for on their goodness that of the medicine depends. The digestion of the spirit with the spices, &c. should be performed without heat, otherwise the flavour of the medicine will be injured. These spirits are grateful reviving cordials: though considerably more simple, they are not less elegant or valuable than many other more elaborate preparations. This medicine has long been held in great esteem, under the name of *Palsy drops*, in all kinds of languors, weakness of the nerves, and decays of age. It may be conveniently taken on sugar, from ten to eighty or a hundred drops.

Tincture of musk. L.

- 453 Take of musk, two drams; rectified spirit of wine, one pound. Digest for ten days, and strain.

Rectified spirit is the most complete menstruum for musk; but in this form it is often impossible to give such a quantity of the musk as is necessary for our purpose; and hence this article is more frequently employed under the form of julep or bolus.

Tincture of myrrh.

- 454 Take of myrrh, bruised, three ounces; proof-spirit, a pint and an half; rectified spirit of wine, half a pint. Digest with a gentle heat for eight days, and strain. L.

Take of myrrh, three ounces; proof-spirit, two pounds and a half. After digestion for ten days, strain off the tincture. L.

The pharmaceutical writers in general have been of opinion, that no good tincture can be drawn from myrrh by spirit of wine alone, without the assistance of fixed alkaline salts. But it appears from proper experiments, that these salts only heighten the colour of the tincture, without enabling the menstruum to dissolve any more than it would by itself. Rectified spirit extracts, without any addition, all that part of the myrrh in which its peculiar smell and taste reside, viz. the resin: and proof-spirit dissolves almost the whole of the drug, except its impurities: hence the combination of these two directed by the London college is perhaps preferable to either by itself.

Tincture of myrrh is recommended internally for warming the habit, attenuating viscid juices, strengthening the solids, opening obstructions, particularly those of the uterine vessels, and resisting putrefaction. Boerhaave greatly esteems it in all languid cases proceeding from simple inactivity; in those female disorders which are occasioned by an aqueous, mucous, sluggish indispersion of the humours, and a relaxation of the vessels; in the fluor albus, and all diseases arising

from a like cause. The dose is from fifteen drops to forty or more. The medicine may doubtless be given in these cases to advantage; though with us, it is more commonly used externally for cleansing foul ulcers and promoting the exfoliation of carious bones.

Tincture of opium. L.

Take of hard purified opium, powdered, ten drams; proof-spirit, one pint. Digest for ten days, and strain.

455

Tincture of opium, commonly called liquid laudanum. E.

Take of opium, two ounces; spirituous cinnamon-water, one pound and a half. Digest four days, and strain off the tincture.

These are very elegant liquid opiates, the menstruum in the last dissolves nearly the whole substance of the opium, and effectually covers its ill flavour. It were to be wished that the shops were furnished with a liquid opiate, in which the proportion of menstruum was still much larger, so as to admit of the dose being determined by weight or measure; the method by drops seeming too precarious for a medicine of so powerful a kind. The following preparation is contrived with this view.

Take of thebaic extract, half a dram; highly rectified spirit of wine, called *alcohol*, ten ounces; simple cinnamon-water, twenty ounces. Digest them together until the opium be dissolved, and then filter the solution through paper.

This preparation is apprehended to be free from all the inconveniences attending the common opiate tinctures. The menstruum dissolves the whole of the opium except the impurities, and consequently the tincture is not liable to any uncertainty in point of strength. The dose may be ascertained to the greatest exactness; one grain of opium is contained in one ounce by measure, which is equal nearly to seven drams by weight. Neither the tinctures in wine nor proof-spirit are so well adapted for keeping as could be wished: in long standing, a part of the opium is gradually thrown off from both, and consequently the tinctures become gradually weaker: the part which thus separates, amounts sometimes, it is said, to near one-fourth of the quantity of opium at first dissolved: it floats on the surface of the vinous tincture, and in the spirituous sinks to the bottom. In the preparation here recommended, it has not been observed that any separation happens.

Instead of the cinnamon-water, pure water may be employed in the mixture: and where aromatic additions are wanted, either with a medicinal intention or for covering the ill smell of the opium, any proper tincture or distilled water may be extemporaneously joined. Saffron, an addition once employed by the Edinburgh college, has been considered as a corrector of opium; but the qualities it was supposed to correct are merely imaginary; nor indeed can that article be of much importance with any intention in the small quantity that enters a dose of the tincture; a grain of opium being accompanied with only half a grain of saffron.

A preparation in some respects similar to that here recommended was introduced into the Edinburgh phar-

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pharmacopœia published in 1774, under the title of *tinctura meconii*. Each ounce of this tincture contained four grains of opium; and it was proposed that the doses of it should be measured, not by drops, but by weight: but as modern physicians are much more bold in giving opium than their predecessors, such a scrupulous accuracy in the dose is not thought at all necessary; and it is not probable that any dangerous consequence will ever arise, merely from a difference in the size of drops. This, however, might be the case, where the thebaic tincture is by accident taken for the tincture of meconium. To such mistakes, however, it was feared that the analogy of the articles, as well as the caution necessary with respect to both, might lead; and it was on many accounts safer to have but one liquid laudanum only. It is, however, much to be regretted, that the liquid laudanum of the London and Edinburgh colleges, which by the former is now styled *tinctura opii*, by the latter *tinctura thebaica*, should differ so much from each other in point of strength.

Camphorated tincture of opium. L.

456 Take of hard purified opium, flowers of benzoin, each one dram; camphor, two scruples; essential oil of aniseed, one dram; proof-spirit, two pints. Digest for three days.

Paregoric elixir. E.

Take of flowers of benzoin, English saffron, each three drams; opium, two drams; essential oil of aniseeds, half a dram; vinous spirit of sal ammoniac, sixteen ounces. Digest for four days in a close vessel, and strain.

These two, though differing not merely in name, may yet be considered as agreeing very nearly in their nature.

The most material differences in the last formula from the first are the substitution of the vinous spirit of sal ammoniac for the proof-spirit, and a larger proportion of opium; the vinous spirit of sal ammoniac is not only, perhaps, a more powerful menstruum, but in most instances coincides with the virtues of the preparation; but as the opium is the ingredient on which we place the principal dependence, so its proportion is increased, in order that we may give it in such a dose as that the acrimony of the menstruum shall not prove hurtful to the stomach.

The London formula is taken from Le Mort, with the omission of three unnecessary ingredients, honey, liquorice, and alkaline salt. It was originally called *elixir asthmaicum*, which name it does not ill deserve. It contributes to allay the tickling which provokes frequent coughing; and at the same time is supposed to open the breast, and give greater liberty of breathing: the opium procures (as it does by itself) a temporary relief from the symptoms; while the other ingredients tend to remove the cause, and prevent their return. It is given to children against the chin cough, &c. from five drops to twenty; to adults, from twenty to an hundred. In the London formula, half an ounce by measure contains about a grain of opium; but in the Edinburgh formula the proportion of opium is larger.

Tincture of rhubarb.

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Take of rhubarb, sliced, two ounces; lesser cardamom seeds, husked and bruised, half an ounce; saffron, two drams; proof-spirit, two pints. Digest for eight days, and strain. L.

457

Take of rhubarb, three ounces; lesser cardamom seeds, half an ounce; proof-spirit two pounds and a half. Digest for seven days, and strain. E.

Compound tincture of rhubarb. L.

Take of rhubarb sliced, two ounces; ginger powdered, saffron, each two drams; liquorice-root, bruised, half an ounce; distilled water, one pint; proof-spirit, twelve ounces. Digest for fourteen days, and strain.

Bitter tincture of rhubarb. E.

Take of rhubarb two ounces; gentian-root, half an ounce; Virginian snake-root, one dram; proof spirit, two pounds and a half. Digest for seven days, and then strain the tincture.

Sweet tincture of rhubarb. E.

It is made by adding to two pounds and a half of the strained tincture of rhubarb, four ounces of sugar-candy.

The last of these preparations is improved from the former editions. Two ounces of liquorice and one of raisins are supplied, by an increase of the sugar-candy.

All the foregoing tinctures of rhubarb are designed as stomachics and corroborants, as well as purgatives: spirituous liquors excellently extract those parts of the rhubarb in which the two first qualities reside, and the additional ingredients considerably promote their efficacy. In weakness of the stomach, indigestion, laxity of the intestines, diarrhœas, colic, and other similar complaints, these medicines are frequently of great service: the second is also, in many cases, an useful addition to the Peruvian bark, in the cure of intermittents, particularly in cachectic habits, where the viscera are obstructed; with these intentions, a spoonful or two may be taken for a dose, and occasionally repeated.

Elixir of aloes and rhubarb, commonly called sacred elixir. E.

Take of rhubarb, cut-small, ten drams; socotorine aloes, in powder, six drams; lesser cardamom seeds, half an ounce; proof-spirit, two pounds and a half. Digest for seven days, and then strain the elixir.

458

This preparation is very much employed as a vomiting cordial purge, and for the general purposes of aloetics; with which, however, it combines the medical properties of rhubarb.

Compound tincture of sassa. L.

Take of extract of sassa, one ounce; tincture of rhubarb, one pint; proof-spirit, half a pint. Digest till the extract of sassa be dissolved, and then strain.

459

This preparation had a place in the last edition of our pharmacopœia, under the title of *elixir catharticum compoundum*.

This preparation is improved from one described in some former dispensaries under the name of *uterine elixir*. It is a medicine of great importance in uterine obstructions, and in hypochondriacal cases; though, possibly, means might be contrived of superadding more effectually the virtues of saffron to a tincture of myrrh and castor. It may be given from five drops to twenty or thirty, or more, in pennyroyal water, or any other suitable vehicle.

Tincture of squill. L.

- 460 Take of squills, fresh dried, four ounces; proof-spirit, two pints. Digest for eight days, and pour off the liquor.

For extracting the virtues of squills, the menstruum which has hitherto been almost solely employed is vinegar. There are, however, cases in which ardent spirit may be more proper; and by the menstruum here directed its virtues are fully extracted. Hence it is with propriety that the London college have introduced this form, as well as the vinegar and oxymel. But, in general, the purposes to be answered by squills may be better obtained by employing it in substance than in any other form.

Antiphthical tincture. E.

- 461 Take of sugar of lead, an ounce and a half; vitriol of iron, one ounce; rectified spirit of wine, one pound. Let a tincture be extracted without heat.

The reducing of the salts *separately* into powder, and performing the digestion *without heat*, are very necessary circumstances: for if the ingredients be attempted to be pulverized together, they will grow soft and almost liquid; and if heat be used, scarce any tincture will be obtained.

This tincture is sometimes given in doses of twenty or thirty drops for restraining immoderate secretions, particularly the colloquative sweats attending hectic fevers and phthical disorders; whence the name *antiphthical tincture*. It is undoubtedly a medicine of great efficacy in these cases, but too dangerous to be rashly ventured on. Some have supposed that it does not contain any of the sugar of lead; but experiments made for that purpose have shown the contrary.

We must, however, consider the above preparation as unscientific. Both the acetous and vitriolic acid have a greater attraction for iron than for lead: and though the vitriolic be capable of discharging the acetous acid, yet it makes not only in its entire state a less perfect union with lead than the acetous acid, but it is now also combined with iron, for which it has a greater attraction, and can therefore only act on the salt of lead in proportion as it is superabundant in the salt of copperas; but in proportion as the vitriolic disengages the acetous acid from the lead, the last, in its turn, will attach itself to the iron. On the whole, it is difficult to ascertain the precise nature of this preparation; it seems always, however, to contain a quantity of lead in a saline state, sufficient to expunge it from prudent practice: or, at least, if in these cases in which it has hitherto been employed, lead be thought necessary, the salt of lead may with more safety and advantage be given in its solid state, particularly when combined with opium: and it is probably on this ac-

count that the present formula has now no place in the London pharmacopœia.

Tincture of senna. L.

Take of senna, one pound; caraway seeds, bruised, one ounce and an half; lesser cardamom-seeds, husked and bruised, half an ounce; raisins, stoned, sixteen ounces; proof-spirit, one gallon. Digest for fourteen days, and strain.

462

Compound tincture of senna, commonly called Elixir of health. E.

Take of senna leaves, two ounces; jalap root, one ounce; coriander seeds, half an ounce; proof spirit, two pounds and a half. Digest for seven days, and to the strained liquor add four ounces of sugarcandy.

Both these tinctures are useful carminatives and cathartics, especially to those who have accustomed themselves to the use of spirituous liquors; they oftentimes relieve flatulent complaints and colics, where the common cordials have little effect: the dose is from one to two ounces. Several preparations of this kind have been offered to the public under the name of *Daffy's elixir*: the two above are equal to any, and superior to most of them. The last in particular is a very useful addition to the castor oil, in order to take off its mawkish taste: and as coinciding with the virtues of the oil, it is therefore much preferable to brandy, shrub, and such like liquors, which otherwise are often found necessary to make the oil sit on the stomach.

Tincture of snake root.

Take of Virginian snake-root, three ounces; proof-spirit, two pints. Digest for eight days, and strain. *L.* Take of Virginian snake-root, two ounces; cochineal, one dram; proof-spirit, two pounds and a half. Digest in a gentle heat for four days, and then strain the tincture. *E.*

463

The tincture of snake-root was in a former pharmacopœia directed to be prepared with the tincture of salt of tartar, which being now expunged, it was proposed to the college to employ rectified spirit; but as the heat of this spirit prevents the medicine from being taken in so large a dose as it might otherwise be, a weaker spirit was chosen. The tincture made in this menstruum, which extracts the whole virtues of the root, may be taken to the quantity of a spoonful or more every five or six hours; and to this extent it often operates as an useful diaphoretic.

Tincture of valerian. L.

Take of the root of wild valerian, in coarse powder, four ounces; proof-spirit, two pints. Digest with a gentle heat for eight days, and strain.

464

The valerian root ought to be reduced to a pretty fine powder, otherwise the spirit will not sufficiently extract its virtues. The tincture proves of a deep colour, and considerably strong of the valerian; though it has not been found to answer so well in the cure of epileptic disorders as the root in substance, exhibited in the form of powder, or bolus. The dose of the tincture is, from half a spoonful to a spoonful or more, two or three times a-day.

Volatile

Volatile tincture of valerian.

Preparation and Composition.

empty. It is very usefully conjoined with the bark, both as covering its disagreeable taste and coinciding with its virtues.

Preparation and Composition.

Sweet elixir of vitriol. E.

465

Take of the root of wild valerian, four ounces; compound spirit of ammonia, two pints. Digest for eight days, and strain. *L.*

Take of wild valerian root, two ounces; vinous spirit of sal ammoniac, one pound. Macerate for six days in a close vessel, and strain. *E.*

Both the compound and vinous spirit of sal ammoniac are here excellent menstrua, and at the same time considerably promote the virtues of the valerian, which in some cases wants an assistance of this kind. The dose may be a tea spoonful or two.

Tincture of veratrum, or white hellebore. E.

466

Take of white hellebore root, eight ounces; proof-spirit, two pounds and a half. Digest them together for ten days, and filter the tincture through paper.

This tincture is sometimes used for acuating cathartics, &c. and as an emetic in apoplectic and maniacal disorders. It may likewise be so managed as to prove a powerful alterative and deobstruent in cases where milder remedies have little effect. But a great deal of caution is requisite in its use: the dose, at first, ought to be only a few drops; if considerable, it proves violently emetic or cathartic.

Acid elixir of vitriol. E.

467

Take of rectified spirit of wine, two pounds; drop into it by little and little six ounces of vitriolic acid; digest the mixture with a very gentle heat in a close vessel for three days, and then add of cinnamon, an ounce and a half; ginger, one ounce. Digest again in a close vessel for six days, and then filter the tincture through paper placed in a glass funnel.

The intention in this process is, to obtain a tincture of aromatic vegetables, in spirit of wine, combined with a considerable proportion of vitriolic acid. When the tincture is first drawn with vinous spirit, and the acid added afterwards, the acid precipitates great part of what the spirit had before taken up: and on the other hand, when the acid is mixed with the spirit immediately before the extraction, it prevents the dissolution of all that it would have precipitated by the former way of treatment: by previously uniting the acid and the vinous spirit together by digestion, the inconvenience is somewhat lessened.

This is a valuable medicine in weakness and relaxations of the stomach and decays of constitution, particularly in those which proceed from irregularities, which are accompanied with slow febrile symptoms, or which follow the suppression of intermittents. It frequently succeeds after bitters and aromatics by themselves had availed nothing; and indeed great part of its virtues depend on the vitriolic acid; which, barely diluted with water, has, in those cases where the stomach could bear the acidity, produced happy effects.

Fuller relates (in his *Medicina Gymnastica*) that he was recovered by Mynsicht's elixir, from an extreme decay of constitution, and continual retchings to vomit. It may be given from 10 to 30 or 40 drops or more, according to the quantity of acid, twice or thrice a-day, at such times as the stomach is most

This is made of the same aromatics, and in the same manner as the aromatic tincture; except that, in place of the vinous, the dulcified spirit of vitriol is employed.

468

This is designed for persons whose stomachs are too weak to bear the foregoing acid elixir; to the taste, it is gratefully aromatic, without any perceptible acidity. The dulcified spirit of vitriol, here directed, occasions little or no precipitation on adding it to the tincture.

A medicine of this kind was formerly in great esteem under the title of *Vigani's volatile elixir of vitriol*; the composition of which was first communicated to the public in the *Pharmacopœia reformata*. It is prepared by digesting some volatile spirits of vitriol upon a small quantity of mint leaves curiously dried, till the liquor has acquired a fine green colour. If the spirit, as it frequently does, partakes too much of the acid, this colour will not succeed: in such case, it should be rectified from a little fixed alkaline salt.

Camphorated spirit of wine. E.

469

Take of camphor, one ounce; rectified spirit of wine, one pound. Mix them together, that the camphor may be dissolved. It may also be made with a double, triple, &c. proportion of camphor.

This solution of camphor is employed chiefly for external uses, against rheumatic pains, paralytic numbnesses, inflammations, for dissolving tumours, preventing gangrenes, or restraining their progress. It is too pungent to be exhibited internally, even when diluted, nor does the dilution succeed well; for on the admixture of aqueous liquors, the camphor gradually separates and runs together into little masses.

Hoffman, Rothen, and others, mention a camphorated spirit not subject to this inconvenience. It is prepared by grinding the camphor with somewhat more than an equal weight of fixed alkaline salt, then adding a proper quantity of proof-spirit, and drawing off one half of it by distillation. This spirit was proposed to be received into our pharmacopœias, under the title of *Spiritus camphure tartarizatus*. But on trial, it did not answer expectation: some of the camphor rises with the spirit in distillation, though but a small quantity; whence, mixed with a large portion of water, it does not sensibly render it turbid; but in a proper quantity, it exhibits the same appearance as the more common camphorated spirit: it did not appear, that spirit distilled from camphor, with or without the alkaline salt, differed at all in this respect.

The most convenient method of uniting camphor with aqueous liquors, for internal use, seems to be by the mediation of almonds, or of mucilages; triturated with these, it readily mingles with water into the form of an emulsion, at the same time that its pungency is considerably abated. It may also be commodiously exhibited in the form of an oily draught, expressed oils totally dissolving it.

The anodyne liniment, commonly called Anodyne balsam. E.

Take of opium, one ounce; white Castile soap, four ounces;

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ounces; camphor, two ounces; essential oil of rosemary, half an ounce; rectified spirit of wine, two pounds. Digest the opium and soap in the spirit for three days; then to the strained liquor add the camphor and oil, diligently shaking the vessel.

The several ingredients in this formula are exceedingly well suited for the purposes expressed in the title of this preparation; the anodyne balsam has accordingly been used with much success to allay pains in strained limbs, and such like topical affections.

Saponaceous balsam or liniment. E.

- 471 This is made in the same manner and of the same ingredients as the anodyne balsam, only omitting the opium.

It is intended as a simplification and improvement of what had formerly the name of *Opodeldock*, and is employed with the same intentions as the two preceding.

Tincture of antimony. Roff.

- 472 Take of antimony, in powder, half a pound; salt of tartar, one pound; rectified spirit, three pints. Mix the antimony with the salt of tartar, and inject them by little and little into a crucible placed in a strong fire. Let the mixture melt thin, and continue in this state for half an hour; after which it is to be poured out into a hot and dry iron mortar. Powder the mass while hot, put it into a heated matras, and pour the spirit on it. Digest them together for three days, and then strain the tincture.

In this process, the alkaline salt unites with the sulphur of the antimony into a hepar; which communicates to the spirit a tincture similar to the tincture of sulphur. This antimonial tincture is supposed to contain likewise some of the reguline parts of the mineral, and is said to have sometimes provoked a puke when taken on an empty stomach, even in a small dose. It stands recommended in doses from ten to sixty drops or more, as a deobstruent, promoter of urine, and purifier of the blood. But there is probably no purpose to be answered by it, which may not be more effectually obtained by other antimonial preparations, particularly the wine of tartar of antimony.

Tincture of colocynth. Succ.

- 473 Take of colocynth, cut small, and freed from the seeds, one ounce; aniseed, one dram; proof-spirit, fourteen ounces. Macerate for three days, and strain through paper.

In this tincture we have the active purgative power of the colocynth. And although it be seldom used as a cathartic by itself, yet even in small quantity it may be advantageously employed to promote the operation of others.

Faint tincture of copper. Gen.

- 474 Take of filings of copper, one dram; spirit of sal ammoniac, an ounce and a half. Mix them, and keep them in a vessel closely stopped, which is to be frequently agitated, till the liquor becomes of a beautiful violet colour.

In this formula the copper is brought to a saline state by means of the volatile alkali. It may therefore be considered as very analogous to the ammoniacal copper. And where recourse is had to it in practice, it is employed with the same intentions.

Tincture of quassia. Succ.

- Take of quassia, bruised, two ounces; proof-spirit, two pounds and an half. Digest for three days, and then strain through paper.

By proof-spirit the medical properties, as well as the sensible qualities of the quassia, are readily extracted. And under this form it may be advantageously employed for answering different purposes in medicine.

Tincture of lac. Succ.

- Take of gum lac, powdered, one ounce; myrrh, three drams; spirit of scurvy-grass, a pint and an half. Digest in a sand heat for three days; after which, strain off the tincture for use.

This tincture is principally employed for strengthening the gums, and in bleedings and scorbutic exulcerations of them: it may be fitted for use with these intentions, by mixing it with honey of roses, or the like. Some recommend it internally against scorbutic complaints, and as a corroborant in gleet, female weaknesses, &c. Its warmth, pungency, and manifestly astringent bitterish taste, point out its virtues in these cases to be considerable, though common practice among us has not yet received it.

Tincture of nux vomica. Roff.

- Take of nux vomica, an ounce and a half; proof-spirit, two pounds. Digest for some days, and then strain it.

The nux vomica, a very active vegetable, has of late, as we have already had occasion to observe, been introduced into practice as taken internally, for the cure of intermittents and of contagious dysentery. In these affections it may be employed under the form of tincture as well as in substance; and in this way it most readily admits of being combined with other articles, either as adjuvantia or corrigentia.

Tincture of amber. Succ.

- Take of yellow amber, powdered, one ounce; vitriolic æther, four ounces. Digest for three days in a vessel accurately closed, frequently shaking the vessel, and after this strain through paper.

The tincture of amber was formerly prepared with rectified spirit of wine: but the menstruum here directed gives a more complete solution, and forms a more elegant and active tincture. It possesses the whole virtues of the concrete; and although it has no place in our pharmacopœia, yet it is perhaps to be considered as one of the most valuable preparations of amber. It has been recommended in a variety of affections, particularly those of the nervous kind, as hysterical and epileptic complaints. It may be taken from a few drops to the extent of a tea spoonful in a glass of wine or any similar vehicle.

CHAP. XXII. *Mixtures.*

Camphorated mixture. L.

479

Take of camphor, one dram; rectified spirit of wine, ten drops; double-refined sugar, half an ounce; boiling distilled water, one pint. Rub the camphor first with the spirit of wine, then with the sugar; lastly, add the water by degrees, and strain the mixture.

While camphor is often exhibited in a solid state, it is frequently also advantageous to employ it as diffused in watery fluids. And with this intention the present formula is perhaps one of the most simple, the union being affected merely by the aid of a small quantity of spirit of wine and a little sugar. But perhaps the more common form of emulsion in which the union is effected, by triturating the camphor with a few almonds, is not to be considered as inferior to this. For the unctuous quality of the almonds serves in a considerable degree to cover the pungency of the camphor without diminishing its activity. Camphor under the present form as well as that of emulsion, is very often useful in fevers, taken to the extent of a table spoonful every three or four hours.

Chalk mixture. L.

480

Take of prepared chalk, one ounce; double-refined sugar, six drams; gum arabic, powdered, two ounces; distilled water, two pints. Mix them.

Chalk-drink. E.

Take of prepared chalk, one ounce; purest refined sugar, half an ounce; mucilage of gum-arabic, two ounces. Rub them together, and add by degrees, water, two pounds and an half; spirituous cinnamon water, two ounces.

These two preparations agree pretty much both in their name and in their nature. But of the two formulae that of the Edinburgh college is most agreeable to the palate, from containing a proportion of cinnamon-water, by which the disagreeable taste of the chalk is taken off.

In the former edition of the Edinburgh pharmacopœia, a preparation of this kind stood among the decoctions, and the chalk was directed to be boiled with the water and gum: by the present formula, the chalk is much more completely suspended by the mucilage and sugar; which last gives also to the mixture an agreeable taste. It is proper to employ the finest sugar, as the redundant acid in the coarser kinds might form with the chalk a kind of earthy salt. It would perhaps have been more proper to have added an aromatic, by suspending the entire powder of cinnamon, or its oil, by means of the mucilage and sugar. The method here directed is, however, less exceptionable in this than many other preparations, as the precipitated matter of the spirituous water will probably be inviscated in the saccharine and mucilaginous matter: This is a very elegant form of exhibiting chalk, and is an useful remedy in diseases arising from, or accompanied with, acidity in the primæ viæ. It is frequently employed in diarrhœa proceeding from that cause. The

mucilage not only serves to keep the chalk uniformly diffused, but also improves its virtues by sheathing the internal surface of the intestines. The dose of this medicine requires no nicety. It may be taken to the extent of a pound or two in the course of a day.

Preparations and Compositions.

Musk mixture. L.

Take of musk, two scruples; gum arabic, powdered, double-refined sugar, of each one dram; rose-water, six ounces by measure. Rub the musk first with the sugar, then with the gum, and add the rose-water by degrees.

481

This had formerly the name of *julepum e muscho*, and was intended as an improvement upon the hylleric julep with musk of Bates. Orange-flower-water is directed by that author; and indeed this more perfectly coincides with the musk than rose-water: but as the former is difficultly procurable in perfection, the latter is here preferred. The julep appears turbid at first: on standing a little time, it deposits a brown powder, and becomes clear, but at the same time loses great part of its virtue. This inconvenience may be prevented by thoroughly grinding the musk with gum-arabic before the addition of the water: by means of the gum, the whole substance of the musk is made to remain suspended in the water. Volatile spirits are in many cases an useful addition to musk, and likewise enable water to keep somewhat more of the musk dissolved than it would otherwise retain.

Almond milk. L.

Take of sweet almonds, one ounce and an half; double-refined sugar, half an ounce; distilled water, two pints. Beat the almonds with the sugar; then, rubbing them to ether, add by degrees the water, and strain the liquor.

482

Cinnamon emulsion. E.

Take of sweet almonds, one ounce; bitter almonds, one dram; common-water, two pounds and a half. Beat the blanched almonds in a stone mortar, and gradually pour on them the common water, working the whole well together, then strain off the liquor.

Arabic emulsion. E.

This is made in the same manner as the preceding; only adding, while beating the almonds, of mucilage of gum-arabic two ounces.

483

All these may be considered as possessing nearly the same qualities. Put of the three the last is the most powerful emollient.

Great care should be taken, that the almonds be not become rancid by keeping; which will not only render the emulsion extremely insipid, and almost of great consequence in a medicine that requires to be taken in large quantities, but likewise give it in quality quite unexpected from preparations of the kind. The addition of the bitter almonds now ordered by the Edinburgh college in preparing these emulsions may perhaps prevent them from becoming so insipidly above charged; but it is much more giving the emulsion an agreeable flavour, though the addition of bitter almonds is necessary.

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rious nature, yet nothing is to be apprehended from the quantity here employed.

These liquors are principally used for diluting and obtunding acrimonious humours; particularly in heat of urine and stranguries arising either from a natural sharpness of the juices, or from the operation of cantharides and other irritating medicines: in these cases, they are to be drank frequently, to the quantity of half a pint or more at a time.

Some have ordered emulsions to be boiled, with a view to deprive them of some imaginary crudity; but by this process they quickly cease to be emulsions, the oil separating from the water, and floating distinctly on the surface. Acids and vinous spirits produce a like decomposition. On standing also for some days, without addition, the oily matter separates and rises to the top, not in a pure form, but like thick cream. These experiments prove the composition of the emulsions made from the oily seeds of kernels, and at the same time point out some cautions to be attended to in their preparation and use.

Ammoniacum milk. L.

- 484 Take of ammoniacum, two drams; distilled water, half a pint. Rub the gum-resin with the water, gradually poured on, until it becomes a milk. In the same manner may be made a milk of asafœtida, and of the rest of the gum-resins.

The ammoniacum milk is used for attenuating tough phlegm, and promoting expectoration, in humoral asthmas, coughs, and obstructions of the viscera. It may be given to the quantity of two spoonfuls twice a day.

The lac asafœtida is employed in spasmodical, hysterical, and other nervous affections. And it is also not unfrequently used under the form of injection. It answers the same purposes as asafœtida in substance.

Compound spirit of vitriolic æther. L.

- 485 Take of spirit of vitriolic æther, two pounds; oil of wine, three drams. Mix them.

This is supposed to be, if not precisely the same, at least very nearly, the celebrated mineral anodyne liquor of Hoffman; as we learn from his own writings, that the liquor which he thus denominated was formed of dulcified spirit of vitriol and the aromatic oil which arises after it, but he does not tell us in what proportions these were combined. It has been highly extolled as an anodyne and antispasmodic medicine; and with these intentions it is not unfrequently employed in practice.

Compound spirit of ammonia. L.

- 486 Take of spirit of ammonia, two pints; essential oil of lemon, nutmeg, of each two drams. Mix them.

This differs almost only in name from the following.

Volatile aromatic spirit, commonly called volatile oily spirit, and fuline aromatic spirit. E.

Take of vinous spirit of sal ammoniac, eight ounces; distilled oil of rosemary, one dram and a half; distilled oil of lemon-peel, one dram. Mix them that the oils may be dissolved.

By the method here directed, the oils are as completely dissolved as when distillation is employed.

Volatile salts, thus united with aromatics, are not only more agreeable in flavour, but likewise more acceptable to the stomach, and less acrimonious than in their pure state. Both the foregoing compositions turn out excellent ones, provided the oils are good, and the distillation skilfully performed. The dose is from five or six drops to sixty or more.

Medicines of this kind might be prepared extemporaneously, by dropping any proper essential oil into the dulcified spirit of sal ammoniac, which will readily dissolve the oil without the assistance of distillation. But it is perhaps preferable that they should be kept in the shops ready mixed.

Succinated spirit of ammonia. L.

Take of alcohol, one ounce; water of pure ammonia, four ounces by measure; rectified oil of amber, one scruple; soap, ten grains. Digest the soap and oil of amber in the alcohol till they be dissolved; then add the water of pure ammonia, and mix them by shaking.

487

This composition is extremely penetrating, and has lately come into esteem, particularly for smelling to in lownesses and faintings, under the name of *eau de luce*. It has been hitherto brought from France. It is not quite limpid, for the oil of amber dissolves only imperfectly in the spirit: if the volatile spirit be not exceedingly strong, scarcely any of the oil will be imbibed.

The *eau de luce* is not only used with the view of making an impression on the nose, but is taken internally in the same cases. It has likewise of late been celebrated as a remedy for the bite of the rattlesnake, when used internally, and applied externally to the wounded part.

Camphorated spirit. L.

Take of camphor, four ounces; rectified spirit of wine, two pints: Mix them, so that the camphor may be dissolved.

488

Of this we have already had occasion to speak in the preceding chapter under the title given to it by the Edinburgh college.

Simple oily emulsion. Gen.

Take of almond oil, one ounce; syrup of althea, an ounce and a half; gum arabic, half an ounce; spring water, six ounces. Mix, and make an emulsion according to art.

489

Volatile oily emulsion. Gen.

Take of almond oil, an ounce and a half; syrup of althea, one ounce; gum-arabic, half an ounce; volatile alkaline salt, one dram; spring-water, seven ounces. Mix them according to art.

Both these are elegant and convenient modes of exhibiting oil internally. And under these forms it is often advantageously employed in cases of cough, hoarseness, and similar affections. By means of the alkali, a more intimate union of oil with water is obtained than can be had with the intermedium either of syrup or vegetable mucilage; and in some cases, the

the alkali both contributes to answer the intention in view, and prevents the oil from exciting sickness at stomach: But in other instances, the purgency which it imparts is disagreeable to the patient and unfavourable to the disease. According to these circumstances, therefore, where an oily mixture is to be employed, the practitioner will be determined in his choice to have recourse either to the one or the other formula.

Acid julep. Gen.

Take of weak vitriolic acid, three drams; simple syrup, three ounces; spring-water, two pounds. Mix them.

In this state, the vitriolic acid is sufficiently diluted to be taken with ease in considerable doses. And it may thus be advantageously employed in various affections; one thing which we have already had occasion to make a few remarks in CHEMISTRY, n^o 617. (see *Chemistry-Index*), and which are to be answered, either by its action on the stomach, or on the system in general.

Ether julep. Gen.

Take of pure vitriolic ether, two scruples; spring-water, six ounces; refined sugar, half an ounce. Mix them according to art.

Although it is in general proper that ether should be diluted only when it is to be immediately used, yet it is sometimes necessary that it should be put into the hands of the patient in the state in which it is to be taken. In such instances the present formula is a very proper one; for the addition of a little mucilage tends both to cover the pungency of the ether in the mouth, and to retain it in a state of mixture with the water.

Amber julep. Gen.

Take of tincture of amber, two drams; refined sugar, half an ounce; spring-water, six ounces. Mix them according to art.

Under this form the tincture of amber is so far diluted and sweetened, as to form an agreeable mixture; and in this manner it may often be advantageously employed for counteracting nervous affections, and answering those other purposes for which we have already mentioned that this article is had recourse to in practice.

Saline mixture, or julep. Succ.

Take of fixed vegetable alkali, three drams; river-water, half a pound. To this fixivism add, lemon-juice, half a pound, or as much as is sufficient to saturate the alkali; syrup of black currants, one ounce.

This mixture is frequently prescribed in febrile diseases as a means of promoting a slight discharge by the surface. For where the skin is parched with great increased heat, it generally operates as a gentle diaphoretic. It often also procures a discharge by the kidneys, and is not infrequently employed to restrain vomiting. With these intentions it is in daily use among British practitioners, although it has no place in our pharmacopoeia, from its being entirely an extemporaneous prescription.

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Mineral solution of arsenic.

Take of white arsenic, reduced to a subtile powder, fixed vegetable alkali, each sixty-four grains; distilled water, half a pint. Put them into a florentine flask, and let this be placed in a sand heat, so that the water may boil gently till the arsenic be completely dissolved; then add to the solution when cold half an ounce of spirit of lavender, and as much distilled water as to make the solution amount to a pint by measure, or fifteen ounces and an half by weight.

For the introduction of this remedy we are indebted to Dr Fowler of St Asaph. We have already had occasion to mention it in our article ARSENIC, n^o 14; see also CHEMISTRY, n^o 1266, Sec. In the former of these places we have observed, that if it be not precisely the same, it is at least supposed to be very analogous to a remedy which has had a very extensive sale in some parts of England under the name of the *tasteless aque drop*; and which has been employed with very great success in the cure of obstinate intermittents. But whether the present formula in any degree approaches to the tasteless aque drop or not, there can be no doubt, from the concurring testimony of many eminent practitioners, that it is equally successful in combating intermittents. For this purpose it is given according to the age and other circumstances of the patient in doses from two to twenty drops, once, twice, or oftener in the course of the day: And its use has been found to be attended with remarkable success, although with some patients even very small doses have been found to excite severe vomiting. Besides distinctly marked intermittents, this solution has also been sometimes successful in obstinate periodical headache, and in cutaneous affections of the leprosy kind, resisting every other mode of cure. And perhaps in every case where arsenic can be employed with safety or advantage internally, this preparation is preferable to any other with which we are yet acquainted.

CHAP XXIII. *Syrups.*

SYRUPS are saturated solutions of sugar, made in water, or watery or vinous infusions, or in juices. They were formerly considered as medicines of much greater importance than they are thought to be at present. Syrups and distilled waters were for some ages used as the great alteratives; inasmuch that the evacuation of any peccant humour was never attempted till by a due course of these it had first been supposed to be regularly prepared for expulsion. Hence rose the exuberant collection of both, which we meet with in pharmacopoeias, and like errors have prevailed in each. As multitudes of distilled waters have been compounded from mineral units to give any virtue over the helm; so numbers of syrups have been prepared from ingredients, which in this form cannot be taken in sufficient doses to exert their virtues; our two-thirds of a syrup consist of sugar, and greatest part of the remaining third is an aqueous fluid.

Syrups are at present chiefly regarded as convenient vehicles for medicines of greater efficacy; and used

for sweetening draughts and juleps, for reducing the lighter powders into bolus, pills, or electuaries, and other similar purposes. Some likewise may not improperly be considered as medicines themselves; as those of saffron, buckthorn-berries, and some others.

To the chapter on *Syrups* the London college in their pharmacopoeia have prefixed the following general observations.

In the making of syrups, where we have not directed either the weight of the sugar, or the manner in which it is to be dissolved, this is to be observed:

Take or double refined sugar, twenty-nine ounces; any kind of liquor, one pint. Dissolve the sugar in the liquor in a water-bath; then set it aside for twenty-four hours; take off the foam, and pour off the syrup from the residue, to be used.

The following are the general rules which have commonly been given with respect to the preparation of syrups.

I. All the rules laid down for making decoctions are likewise to be observed in the decoctions or syrups. Vegetables, both for decoctions and infusions, ought to be dry, unless they are expressly ordered otherwise.

II. In both the London and Edinburgh pharmacopoeias, only the purest or double refined sugar is allowed.

In the syrups prepared by boiling, it has been customary to perform the clarification with whites of eggs after the sugar had been dissolved in the decoction of the vegetable. This method is apparently injurious to the preparation; since not only the impurities of the sugar are thus discharged, but a considerable part likewise of the medicinal matter, which the water had before taken up from the ingredients, is separated along with them. Nor indeed is the clarification and decumation of the sugar, by itself, very advisable; for its purification by this process is not so perfect as might be expected: after it has undergone this process, the refineries still separate from it a quantity of oily matter, which is disagreeable to weak stomachs. It appears therefore most eligible to employ fine sugar for all the syrups; even the purgative ones (which have been usually made with coarse sugar, as somewhat coinciding with their intention) not excepted; for, as purgative medicines are in general ungrateful to the stomach, it is certainly improper to employ an addition which increases their offensiveness.

III. Where the weight of the sugar is not expressed, twenty-nine ounces are to be taken in every pint of liquor. The sugar is to be reduced into powder, and dissolved in the liquor by the heat of a water-bath, unless ordered otherwise.

Although in the formula of several of the syrups, a double weight of sugar to that of the liquor is directed, yet less will generally be sufficient. First, therefore, dissolve in the liquor an equal weight of sugar, then gradually add some more in powder, till a little remains undissolved at the bottom, which is to be afterwards incorporated by setting the syrup in a water-bath.

The quantity of sugar should be as much as the liquor is capable of keeping dissolved in the cold: if there is more, a part of it will separate, and concrete into crystals or candy; if less, the syrup will be sub-

ject to ferment, especially in warm weather, and change into a viscous or thin liquor. If in clarifying, only the superfluous part be separated, it would be of no inconvenience; but when part of the sugar has condensed, the remaining syrup is found to have an under proportion, and is as subject to fermentation as if it had wanted sugar at first.

IV. Copper-vessels, unless they be well tinned, should not be employed in the making of acid syrups, or such as are composed of the juices of fruits.

The confectioners, who are the most sweetening people at these kinds of preparation, to save the expence of frequently new tinning their vessels, rarely make use of any other than copper ones untinned, in the preparation even of the most acid syrups, as of oranges and lemons. Nevertheless, by taking care that their coppers be well tinned and perfectly clean, and that the syrup remain no longer in them than is absolutely necessary, they avoid any injury to taste or quality from the metal. This practice, however, is by no means to be recommended to the apothecary.

V. The syrup, when made, is to be set by till next day; if any saccharine crust appears upon the surface it is to be taken off.

Syrup of vinegar. E.

Take of vinegar, two pounds and an half; refined sugar, three pounds and an half. Boil them till a syrup be formed.

This is to be considered as simple syrup merely acidulated, and is by no means unpleasant. It is often employed in mucilaginous mixtures and the like; and on account of its cheapness it is often preferred to syrup of lemons.

Syrup of marshmallows.

Take of fresh root of marshmallow, bruised, one pound; double refined sugar, four pounds; distilled water, one gallon. Boil the water with the marshmallow root to one half, and press out the liquor when cold. Set it by twelve hours; and, after the feces have subsided, pour off the liquor. Add the sugar, and boil it to the weight of six pounds. *L.*

Take of marshmallow roots, somewhat dried, nine ounces; water, ten pounds; purest sugar, four pounds. Boil the water with the roots to the consumption of one half, and strain the liquor, strongly expressing it. Suffer the strained liquor to rest till the feces have subsided; and when it is free from the dregs, add the sugar; then boil so as to make a syrup. *E.*

The syrup of marshmallows seems to have been a sort of favourite among dispensatory writers, who have taken great pains to alter and amend it, but have been wonderfully tender in retrenching any of its articles. In the last prescription, it is lost of its superfluities, without any injury to its virtues. It is used chiefly in nephritic cases, for sweetening emollient decoctions, and the like: of itself it can do little service, notwithstanding the high opinion which some have entertained of it; for what can be expected from two or three spoonfuls of the syrup, when the decoction, from which two or three pounds are made, may be taken at a draught or two? It is sometimes useful in tickling coughs,

coughs, by insensating irritating matter distilling in the fauces: in this way it sometimes affords considerable relief.

Syrup of clove July flower.

498 Take of fresh clove July flowers, the heads being cut off, two pounds; boiling distilled water, six pints. Macerate the flowers for twelve hours in a close vessel; and in the strained liquor dissolve the double-refined sugar, that it may be made a syrup. *L.*

Take of clove July flowers, fresh gathered and freed from the heads, one pound; purest sugar, seven pounds and a quarter; boiling water, four pounds. Macerate the flowers in the water for a night; then to the strained liquor add the sugar previously beat, and dissolve it by a gentle heat, to make the whole into a syrup. *E.*

This syrup is of an agreeable flavour, and a fine red colour; and for these it is chiefly valued. Some have substituted for it one easily preparable at seasons when the flowers are not to be procured: an ounce of clove spice is infused for some days in twelve ounces of white wine, the liquor strained, and, with the addition of twenty ounces of sugar, boiled to a proper consistence; a little cochineal renders the colour of this syrup exactly similar to that prepared from the clove July-flower; and its flavour is of the same kind, though not so pleasant. The abuse may be readily detected by adding to a little of the syrup some alkaline salt or ley; which will change the genuine syrup to a green colour; but in the counterfeit, it will make no such alteration, only varying the shade of the red.

As the beauty of the colour is a principal quality in this syrup, no force in the way of expression should be used in separating the liquor from the flowers.

Syrup of colchicum. E.

499 Take of colchicum root, fresh and succulent, cut into small pieces, one ounce; vinegar, sixteen ounces; purest sugar, twenty-six ounces. Macerate the root in the vinegar two days, now and then shaking the vessel; then strain it with a gentle pressure. To the strained liquor add the sugar, and boil a little, so as to form a syrup.

This syrup seems to be the best preparation of the colchicum; great care is required to take up the root in the proper season: and from errors of this kind we are to ascribe the uncertainty in the effects of this medicine as found in the shops.

The syrup of colchicum is often successfully employed as a diuretic, and may be taken from a dram or two to the extent of an ounce or more.

Syrup of orange-peel.

500 Take of fresh outer-rind of Seville-oranges, eight ounces; boiling distilled water, five pints. Macerate for twelve hours in a close vessel; and in the strained liquor dissolve double-refined sugar to make a syrup. *L.*

Take of yellow rind of Seville orange-peel fresh, six ounces; boiling water, three pounds. Infuse them for a night in a close vessel; then strain the liquor; let it stand to settle; and having poured it off clear from the sediment, dissolve in it four pounds and a

quarter of white sugar, so as to make it into a syrup with a gentle heat. *E.*

In making this syrup, it is particularly necessary that the sugar be previously powdered, and dissolved in the infusion with as gentle a heat as possible, to prevent the exhalation of the volatile parts of the peel. With these cautions, the syrup proves a very elegant and agreeable one, possessing great share of the fine flavour of the orange-peel.

Syrup of saffron. L.

Take of saffron, one ounce; boiling distilled water, one pint. Macerate the saffron, in the water, for twelve hours, in a close vessel; and dissolve double-refined sugar in the strained liquor, that it may be made a syrup.

Saffron is very well fitted for making a syrup, as in this form a sufficient dose of it is contained in a reasonable compass. This syrup is at present frequently prescribed; it is a pleasant cordial, and gives a fine colour to juleps.

Syrup of lemon juice.

Take of lemon juice, strained, after the feces have subsided, two pints; double refined sugar, sixty ounces. Dissolve the sugar, that it may be made a syrup. *L.*
Take of juice of lemons, suffered to stand till the feces have subsided, and afterwards strained, two pounds and a half; double refined sugar, sixty ounces. Dissolve the sugar in the juice, so as to make a syrup. *E.*

Syrup of mulberry-juce. L.

Syrup of raspberry-juce. L.

Syrup of black currants. L.

These three are directed by the London college to be prepared in the same manner as syrup of lemons, which immediately precedes them.

All these four are very pleasant cooling syrups; and with this intention they are occasionally used in draughts and juleps, for quenching thirst, abating heat, &c. in inflammation or inflammatory distempers. They are sometimes likewise employed in gargarisms for inflammations of the mouth and tonsils.

Syrup of the white poppy. L.

Take of the heads of white poppies, dried, and the seeds taken out, three pounds and an half; double-refined sugar, six pounds; distilled water, eight gallons. Slice and bruise the heads, then boil them in the water, to three gallons, in a water-bath situated with scum, and press out the liquor. Reduce this by boiling to about the measure of four pints, and strain it while hot, first through a sieve, then through a thin woollen cloth, and set it aside for twelve hours, that the feces may subside. Boil the liquor, poured off from the feces, to three pints, and dissolve the sugar in it that it may be made a syrup.

Syrup of white poppies, &c. of meconium, commonly called diacodium. E.

Take of white poppy heads, dried, and freed from the seeds,

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feces, two pounds; boiling-water, thirty pounds; purest sugar, four pounds. Macerate the bruised heads in the water for a night; next boil till only one third part of the liquor remain; then strain it, expelling it strongly. Boil the strained liquor to the consumption of one half, and strain again; lastly, add the sugar, and boil to a syrup. It may also be made by dissolving in two pounds and a half of simple syrup, one dram of the extract of white poppies.

This syrup, impregnated with the opiate matter of the poppy heads, is given to children in doses of two or three drams; to adults from half an ounce to an ounce and upwards, for easing pain, procuring rest, and answering the other intentions of mild opiates. Particular care is requisite in its preparation, that it may be always made as nearly as possible, of the same strength; and accordingly the colleges have been very minute in their description of the process.

Syrup of the red poppy. L.

504 Take of the fresh flowers of the wild or red poppy, four pounds; boiling distilled water, four pints and an half. Put the flowers by degrees into the boiling water in a water bath, constantly stirring them. After this, the vessel being taken out of the bath, macerate for twelve hours; then press out the liquor, and set it apart, that the feces may subside. Lastly, make it into a syrup, with double refined sugar.

The design of putting the flowers into boiling water in a water bath is, that they may be a little scalded, so as to shrink enough to be all immersed in the water; without this artifice they can scarcely be all got in: but they are no longer to be continued over the fire than till this effect is produced, lest the liquor become too thick, and the syrup be rendered ropy.

This syrup has been recommended in disorders of the breast, coughs, spitting of blood, pleurifies, and other diseases, both as an emollient and as an opiate. It is one of the lightest of the opiate medicines; and in this respect so weak, that some have doubted of its having any anodyne quality. We indeed presume, that it might be very safely superseded altogether; and accordingly it has now no place either in the Edinburgh pharmacopœia, or some of the best foreign ones, though still retained by the London college.

Rose syrup. L.

505 Take of the dried leaves of the damask rose, seven ounces; double-refined sugar, six pounds; boiling distilled water, four pints. Macerate the rose leaves in water for twelve hours, and strain. Evaporate the strained liquor to two pints and an half, and add the sugar, that it may be made a syrup.

Syrup of pale roses. E.

Take of pale roses, fresh gathered, one pound; boiling water, four pounds; white sugar, three pounds. Macerate the roses in the water for a night; then to the liquor strained, and freed from the dregs, add the sugar; and boil them into a syrup.

This syrup may likewise be made from the liquor remaining after the distillation of rose-water depurated from its feces.

The liquor remaining after the distillation of roses (provided the still has been perfectly clean) is as proper for making this syrup as a fresh infusion; for the distillation only collects those volatile parts which are dissipated in the air while the infusion is boiling to its consistence. This syrup is an agreeable and mild purgative for children, in the dose of half a spoonful or a spoonful. It likewise proves gently laxative to adults; and with this intention may be of service in colic habits. Its principle use is in solutive glisters.

Syrup of dry roses. E.

Take of red roses, dried, seven ounces; white sugar, six pounds; boiling water, five pounds. Infuse the roses in the water for a night, then boil them a little; strain out the liquor, and adding to it the sugar, boil them to the consistence of a syrup.

This syrup is supposed to be mildly astringent; but is principally valued on account of its red colour. The London college have omitted it, having retained others at least equal to it in that respect.

Syrup of squills. E.

Take of vinegar of squills, two pounds; white sugar, three pounds and a half. Make them into a syrup with a gentle heat.

This syrup was formerly prepared with some spices, intended to alleviate the offensiveness of the squills. But while they had not this effect, they often counteracted the intention in view, and are therefore omitted. It is used chiefly in doses of a spoonful or two, for promoting expectoration, which it does very powerfully.

Simple or common syrup. E.

Take of purest sugar, fifteen parts; water, eight parts. Let the sugar be dissolved by a gentle heat.

This preparation is a plain liquid sweet, void of flavour or colour. It is convenient for sundry purposes where these qualities are not wanted, or would be exceptionable.

Syrup of buckthorn.

Take of the juice of ripe and fresh buckthorn berries, one gallon; ginger, bruised, one ounce; all spice, powdered, one ounce and an half; double-refined sugar, seven pounds. Set by the juice for some days, that the feces may subside, and strain. Macerate the ginger and all-spice in a pint of the strained juice for four hours, and strain. Boil away the rest of the juice to three pints; then add that part of the juice in which the ginger and all-spice have been macerated; and, lastly, the sugar, that it may be made a syrup. L.

Take of juice of the ripe buckthorn berries, depurated, seven pounds and a half; white sugar, three pounds and a half. Boil them to the consistence of a syrup. E.

Both these preparations, in doses of three or four spoonfuls, operate as brisk cathartics. The principal inconveniences attending them are, their being very unpleasant, and their occasioning a thirst and dryness of the mouth and fauces, and sometimes violent gripes. These effects may be prevented by drinking freely of water.

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water-gruel, or other warm liquids, during the operation. The ungratefulness of the buckthorn is endeavoured to be remedied in the first of the above prescriptions by the addition of aromatics, which, however, are scarcely sufficient for that purpose. The second also had formerly an aromatic material for the same intention, a dram of the essential oil of cloves; which being found ineffectual, is now rejected.

Syrup of balsam of Tolu. L.

Take of the balsam of Tolu, eight ounces; distilled water, three pints. Boil for two hours. Mix with the liquor, strained after it is cold, the double-refined sugar, that it may be made a syrup.

Balsamic syrup. E.

Take of simple syrup, just made, and warm from the fire, two pounds; tincture of balsam of Tolu, one ounce. When the syrup has grown almost cold, stir into it the tincture, by little at a time, agitating them well together till perfectly united.

This last method of making the balsamic syrup was dropt in one of the preceding editions of the Edinburgh pharmacopœia, on a complaint that the spirit spoiled the taste of the syrup; which it did in a great degree when the tincture was drawn with malt spirits, the nauseous oil which all the common malt spirits are accompanied with communicating that quality; and this was particularly the case when the spirituous part was evaporated from the syrup, as was directed in the former edition of the Edinburgh pharmacopœia. Particular care therefore should be taken that the spirit employed for making the tincture be perfectly clean, and well rectified from all ill flavour.

The intention of the contrivers of the two foregoing processes seems to have been somewhat different. In the first, the more subtle and fragrant parts of the balsam are extracted from the grosser resinous matter, and alone retained in the syrup: the other syrup contains the whole substance of the balsam in larger quantity. They are both moderately impregnated with the agreeable flavour of the balsam.

In some pharmacopœias a syrup of this kind is prepared from a tincture of balsam of Peru, with rose-water, and a proper quantity of sugar.

Syrup of violets.

Take of the fresh petals of the violet, two pounds; boiling distilled water, five pints. Macerate for 24 hours; afterwards strain the liquor, without pressing, through thin linen. Add refined sugar, that it may be made a syrup. *L.*

Take of fresh violets, one pound; boiling water, four pounds; purest sugar, seven pounds and a half. Macerate the violets in the water for 24 hours in a glass, or at least a glazed earthen vessel, close covered; then strain without expression, and to the strained liquor add the sugar powdered, and make into a syrup. *E.*

This syrup is of a very agreeable flavour; and in the quantity of a spoonful or two proves to children gently laxative. It is apt to lose, in keeping, the elegant blue colour, for which it is chiefly valued; and

hence some have been induced to counterfeit it with materials whose colour is more permanent. This abuse may be readily discovered, by adding to a little of the suspected syrup any acid or alkaline liquor. If the syrup be genuine, the acid will change its blue colour to a red, and the alkali will change it to a green; but if counterfeit, these changes will not happen. It is obvious, from this mutability of the colour of the violet, that the prescriber would be deceived if he should expect to give any blue tinge to acidulated or alkalinized juleps or mixtures by the addition of the blue syrup.

Syrup of ginger.

Take of ginger, bruised, four ounces; boiling distilled water, three pints. Macerate for four hours, and strain; then add refined sugar, that it may be made a syrup. *L.*

Take of powdered ginger, three ounces; boiling water, four pounds; purest sugar, seven pounds and a half. Macerate the ginger in the water in a close vessel for 24 hours; then to the liquor, strained and freed from the feces, add the powdered sugar, and make them into a syrup. *E.*

These are agreeable and moderately aromatic syrups, lightly impregnated with the flavour and virtues of the ginger.

Acid of syrup. Gen.

Take of weak spirit of vitriol, two drams; syrup of lemons, six ounces. Mix them.

Where we wish to obtain a syrup, not only strongly acidulated, but also powerfully astringent, this formula may be considered as well suited to answer the purpose.

Alkaline Syrup. Gen.

Take of salt of tartar, three drams; simple syrup, six ounces. Mix them.

In this syrup we have in some degree the converse of the preceding; and it may be usefully employed either for the destruction of acid in the stomach, or for the formation of neutral or effervescent mixtures.

Syrup of garlic. Suec.

Take of the fresh root of garlic, sliced, one pound; boiling water, two pounds. Macerate them in a close vessel for an hour. Add to the strained liquor, refined sugar, two pounds. Boil them to a syrup.

This syrup formerly held a place in our pharmacopœia, and was recommended for promoting expectation in cases of chronic catarrh and other affections of the breast: but, as well as the oxymel of garlic, it is now banished from them; and there can be little doubt that the same intentions may in general be answered by less disagreeable medicines. Yet where we wish to employ garlic in a watery menstruum, this formula is perhaps one of the best under which it can be exhibited.

Syrup of almonds. Suec.

Take of sweet almonds, one pound; bitter almonds, two drams. Let the almonds be blanched and beat in a stone mortar with a wooden pestle: then by degrees add barley-water, two pounds; strain the liquor,

liquor, and form it into a syrup, with as much double refined sugar as may be necessary.

The agreeable flavour of the almonds is in this formula communicated to a syrup, which may be advantageously employed to sweeten mixtures, or to form a pleasant drink when dissolved in water; and the flavour is not a little improved by the addition of the proportion of bitter almonds here directed. But even these cannot be supposed to communicate any active quality to this syrup, as they are employed in so small a quantity: and still less is to be expected from the sweet almonds, which can communicate little more to the syrup than their mild oil.

Syrup of cinnamon. Ross.

517 Take of cinnamon, bruised, five ounces; spirituous common water, two pounds. Digest them in a close glass vessel for 24 hours; then add to the strained liquor double refined sugar, three pounds. Boil it to a syrup.

This syrup is strongly impregnated with the cinnamon; and where we wish to sweeten any mixture, at the same time adding to it an agreeable aromatic, it is perhaps one of the best articles we can employ.

Emetic syrup. Brun.

518 Take of glass of antimony, finely powdered, two drams; Rhine wine, twelve ounces. Let them be digested for three days in a gentle heat; then strain the liquor through paper, and mix with the strained liquor 30 ounces of double refined sugar. Let it be formed into a syrup, and kept in a close vessel.

There can be no doubt of this syrup being strongly impregnated with the emetic quality of the antimony; and it will at least have so far the advantage of being very agreeable to the taste, that it may be readily taken by very young people. But every good effect to be obtained from it may be had with more certainty, by adding to single syrup any quantity that may be thought necessary of the antimonial salt previously dissolved in a small proportion of water.

Syrup of quicksilver. Suec.

519 Take of purified quicksilver, one dram; gum arabic, three drams; rose-water, as much as sufficient for reducing the gum to a mass. Let them be rubbed in a mortar till the quicksilver totally disappears; then by degrees mix with it simple syrup, four ounces.

In this we have a preparation similar to the mercurial solution of Dr Plenck formerly mentioned; and which, while it does not possess any other advantage than mere sweetness of taste, is liable to the objections formerly urged against that preparation.

CHAP. XXIV. Medicated Honeys.

520 THE more fixed parts of vegetables, dissolved in watery liquors, may be thence transferred into honey, by mixing the honey with the watery decoction or juice of the plant, and boiling them together till the aqueous part has exhaled, and the honey remains of its original consistence. Honey has not probably,

however, any very peculiar advantage over sugar, and it is liable to many inconveniences which sugar is free from: in particular, it is much more liable to run into fermentation, and in many constitutions produces gripes, and often violent effects. The English cannot have therefore rejected the whole of the oxy-mels from their last edition of the pharmacopœia. And the number of preparations with honey in most of the foreign pharmacopœias is now much diminished. Still, however, there are several much employed by practitioners of emetics; and of course retained in the London pharmacopœia.

Honey of roses. L.

Take of dried red rose-leaves, with the heels cut off, four ounces; boiling distilled water, three pints; clarified honey, five pounds. Macerate the rose leaves in the water for six hours; then mix the honey with the strained liquor, and boil the mixture to the thickness of a syrup.

This preparation is not so frequently used as a mild cooling detergent, particularly in gargarisms for ulcerations and inflammation of the mouth and tonsils. The rose buds here used should be hastily dried: the design of doing so is, that they may the better preserve their astringency.

Honey of squills. L.

Take of clarified honey, three pounds; tincture of squills, two pints. Boil them in a glass vessel to the thickness of a syrup.

The honey will here be impregnated with all the active parts of the squills which the tincture before contained, and may be employed as an useful expectorant or diuretic.

Oxymel of verdigrise. L.

Take of prepared verdigrise, one ounce; vinegar, seven ounces; clarified honey fourteen ounces. Dissolve the verdigrise in the vinegar, and strain it through linen: then add the honey, and boil the whole to a proper thickness.

This is an elegant form of what was formerly known in our pharmacopœia under the title of *Æmula-cum*; which, however, was, as often compared, very uncertain with respect to strength. It is safer any extent to be depended on, and it is very strong, and is often used in the treatment of venereal ulcerations of the mouth and tonsils. But there is some danger from its application to places from the situation of which it is apt to be swallowed; for even a small quantity of verdigrise passing into the stomach may be productive of distressing, if not deleterious, effects.

Oxymel of madder saffron. L.

Take of the fresh root of mallow-saffron, cut into thin slices, one ounce; distilled vinegar, one pint; clarified honey, two pounds. Macerate the root of mallow-saffron with the vinegar, in a glass vessel, with a gentle heat, for 48 hours. Strain the liquor, pressed out strongly from the root, and add the honey. Lastly, boil the mixture, frequently stirring it with a wooden spoon, to the thickness of a syrup.

This oxymel may be considered as very analogous to the syrup of colchicum, of which we have already made some observations. Under this form it was first introduced by Dr Stoerk. And although with certain constitutions the syrup is unquestionably preferable, yet it well deserves a place in our pharmacopœias, as being an active medicine.

Oxymel of squills. L.

- 525 Take of clarified honey, three pounds; vinegar of squills, two pints. Boil them in a glass vessel, with a slow fire, to the thickness of a syrup.

The honey was formerly employed for this preparation undisturbed, and the foam, which in such cases arises in the boiling, taken off: by this means the impurities of the honey were discharged; but some of the medicinal parts of the squills, with which the vinegar was impregnated, were also separated. For this reason the college of London have now judiciously ordered the honey for all these kinds of preparations to be previously clarified by itself.

Oxymel of squills is an useful aperient, detergent, and expectorant, and of great service in humoral asthma, coughs, and other disorders where thick phlegm abounds. It is given in doses of two or three drams, along with some aromatic water, as that of cinnamon, to prevent the great nausea which it would otherwise be apt to excite. In large doses it proves emetic.

Simple oxymel. L.

- 526 Take of clarified honey, two pounds; distilled vinegar, one pint. Boil them in a glass vessel, with a slow fire, to the thickness of a syrup.

This preparation may be considered as analogous to the *syrupus aceti* of the Edinburgh pharmacopœia. It is not inferior in efficacy to many more elaborate compositions. It is an agreeable, mild, cooling medicine. It is often used in cooling detergent gargarisms, and not unfrequently as an expectorant.

Oxymel of garlic. Dan.

- 527 Take of garlic, cut in slices, an ounce and a half; caraway seeds, sweet fennel seeds, each two drams; clarified honey, ten ounces; vinegar, half a pint. Boil the vinegar for a little time, with the seeds bruised, in a glazed earthen vessel; then add the garlic, and cover the vessel close; when grown cold, press out the liquor, and dissolve in it the honey by the heat of a water bath.

This oxymel is recommended for attenuating viscid juices, promoting expectoration, and the fluid secretions in general. It is doubtless a medicine of considerable efficacy, though very unpleasant, the flavour of the garlic prevailing notwithstanding the addition of the aromatic seeds.

Pectoral oxymel. Prun.

- 528 Take of elecampane roots, one ounce; orris root, half an ounce; gum ammoniac, one ounce; vinegar, half a pint; clarified honey, one pound; water, three pints. Let the roots, cut and bruised, be boiled in the water till one third is wasted: then strain off the liquor; let it stand to settle; and having poured it off clear from the feces, add to it

the honey and the ammoniac, previously dissolved in the vinegar. Mix them together, by gently boiling them.

The title of this composition expresses its medical virtues. It is designed for those disorders of the breast that proceed from a load of viscid phlegm, and obstructions of the pulmonary vessels. Two or three spoonfuls may be taken every night and morning, and continued for some time.

CHAP. XXV. *Powders.*

THIS form receives such materials only as are capable of being sufficiently dried to become pulverisable without the loss of their virtue. There are many substances, however, of this kind, which cannot be conveniently taken in powder: bitter, acrid, fetid drugs, are too disagreeable; emollient and mucilaginous herbs and roots are too bulky; pure gums cohere, and become tenacious in the mouth; fixed alkaline salts liquefy on exposing the composition to the air; and volatile alkalis exhale. Many of the aromatics, too, suffer a greater loss of their odorous principle when kept in powder; as in that form they no doubt expose a much larger surface to the air.

The dose of powders, in extemporaneous prescription, is generally about half a dram: it rarely exceeds a whole dram, and is not often less than a scruple. Substances which produce powerful effects in smaller doses are not trusted to this form, unless their bulk be increased by additions of less efficacy; those which require to be given in larger ones are better fitted for other forms.

The usual vehicle for taking the lighter powders is any agreeable thin liquid: The ponderous powders, particularly those prepared from metallic substances, require a more consistent vehicle, as syrups; for from thin ones they soon subside: Resinous substances likewise are not commodiously taken in thin liquors; in thin ones they are apt to run into lumps, which are not easily again soluble.

General rules for making powders.

I. Particular care ought to be taken that nothing carious, decayed, or impure, be mixed in the composition of powders: the stalks and corrupt parts of plants are to be separated.

II. The dry aromatics ought to be sprinkled, during their pulverization, with a few drops of any proper water.

III. The moister aromatics may be dried with a very gentle heat before they are committed to the mortar.

IV. Gums, and such other substances as are difficultly pulverisable, should be pounded along with the denser ones, that they may press the more together.

V. No part should be separated for use until the whole quantity put into the mortar has passed the sieve, and the several siftings mixed together; for those parts of the substances which are not powdered may prove different, either in degree of efficacy, from the rest.

VI. Powders of aromatics are to be prepared only in small quantities at a time, and kept in glass vessels very closely stoppered.

If powders are long kept, and not carefully secured from the air, their virtue is in a great measure destroyed, although

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tion.

with such the parts in which it consists should not in other circumstances prove venereal. Thus, though the virtues of these ingredients are so fixed as to remain entire even in extracts made with proper menstrua, yet if the powdered root be exposed for a long time to the air, it loses its emetic quality.

Aloetic powder. L.

- 530 Take of sacotorine aloes, one pound; white canella, three ounces. Rub them separately to powder, and then mix them.

This composition has long been known in the shops under the title of *Lana pura*. It furnishes us with an equal aloetic purgative, the canella operating as a good corrigent for the aloes. But it is more frequently employed as the basis of electuaries or pills, or of a tincture which was for a long time distinguished by the appellation of *sacred tincture*.

Aloetic powder with iron. L.

- 531 Take of sacotorine aloes, powdered, an ounce and an half; myrrh, powdered, two ounces; dry extract of gentian, vitriolated iron, of each, in powder, one ounce. Mix them.

In this powder we have an aloetic and chalybeate joined. It consists of nearly the same articles which formerly entered the composition of the *pilula cephalica chalybeata*, as they were called; and it is perhaps more frequently employed when brought to the form of pills by means of syrups than in powder; but in either way it is a useful medicine, and is particularly employed with advantage in cases of obstructed menstruation.

Aloetic powder with guaiacum. L.

- 532 Take of sacotorine aloes, one ounce and an half; gum guaiacum, one ounce; aromatic powder, half an ounce. Rub the aloes and gum guaiacum separately to powder; then mix all the ingredients together.

In the guaiacum, as well as the aloes, we have a warm and miscrefuous purgative; and both are corrected, as well as more minutely divided, from their combination with the aromatics. This therefore furnishes us with an useful purgative; but when taken only in small doses, its chief effect is that of promoting perspiration. It is, however, more frequently employed in the form of pills than in the state of powder; and indeed it consists of nearly the same ingredients which constitute the *pilula aromatica* of the former edition of the London pharmacopoeia.

Aromatic powder. L.

- 533 Take of cinnamon, two ounces; smaller cardamom seeds husked, ginger, long pepper, of each one ounce. Rub them together to a powder.

Aromatic powder, or aromatic spices. E.

Take of nutmegs, lesser cardamom seeds, ginger, each two ounces. Beat them together into a powder, to be kept in a phial well shut.

Both these compositions are agreeable, hot, spicy medicines; and as such may be usefully taken in cold phlegmatic habits and decayed constitutions, for warming the stomach, promoting digestion, and strengthen-

ing the tone of the viscera. The dose is from ten to twenty grains to a scruple and upwards. The first is considerably the warmest. This principally arises from the quantity of long pepper which it contains. But it is perhaps to be doubted whether from this article any advantage be derived; and a powder not inferior to either might, we think, be formed, by substituting cassia for the cinnamon employed by the one college, or the nutmegs by the other.

Compound powder of asarabacca. L.

- Take of the dry leaves of asarabacca, sweet marjoram, Syrian herb matthick, dry flowers of lavender, each one ounce. Powder them together.

534

Stimulatory or cephalic powder. E.

- Take of the leaves of asarum, three parts; marjoram, one part. Beat them together into a powder.

Though the former of these powders be more compounded than the latter, yet they differ very little. They are both agreeable and efficacious emollients, and superior to most of those usually sold under the name of *herb pills*. They are often employed with great advantage in cases of obstinate headache, and of ophthalmias resisting other modes of cure. Taken under the form of snuff to the extent of five or six grains at bed-time, they will operate the succeeding day as a powerful erethic, inducing frequent sneezing, but still more a large discharge from the nose. It is, however, necessary, during their operation, to avoid exposure to cold.

Powder of ceruse. L.

- Take of ceruse, five ounces; sarcocoll, one ounce and an half; tragacanth, half an ounce. Rub them together into powder.

535

This composition is the *trochisci albi* of Rhazes brought back to its original simplicity with regard to the ingredients, and without the needless trouble of making it into troches. It is employed for external purposes, as in collyria, lotions, and injections, for repelling acrimonious humours, and in inflammations.

Compound powder of crabs claws. L.

- Take of crabs claws, prepared, one pound; chalk, red coral, each, prepared, three ounces. Mix them.

536

These powders have lost several of their ingredients without any injury to their virtues; and possibly they would still bear a farther reduction, for the crabs eyes and chalk are by themselves at least as essential as any composition of them with coral. And perhaps every purpose to be obtained from them may be accomplished by a more simple absorbent, as the chalk powder afterwards to be mentioned, or the powder of the lapilli cancerorum.

Compound powder of contrayerva. L.

- Take of contrayerva, powdered, five ounces; compound powder of crabs claws, one pound and an half. Mix them.

537

This powder was formerly directed to be made up into balls with water, and was then called *lapis contrayerva*; a piece of trouble now laid aside as needless, for it was necessary to reduce the balls into powder

again before they could be used. Nor did that form contribute, as has been imagined, to their preservation; for it is scarcely to be supposed that the powder will lose more by being kept for a reasonable length of time in a close-stopt glass than the balls will in the humectation with water and exsiccation in the air before they are fit for being put by to keep. This medicine has much better claim to the title of an alexipharmac and sudorific than the foregoing compositions. The contrayerva by itself proves very serviceable in low fevers, where the *vis vite* is weak, and a diaphoretic to be promoted. It is possible that the crabs claws are of no farther service than as they divide this powerful ingredient, and make it fit more easily on the stomach.

Compound powder of chalk. L.

538 Take of prepared chalk, half a pound; cinnamon, four ounces; tormentil, gum-arabic, of each three ounces; long pepper, half an ounce. Powder them separately, and mix them.

Chalk powder. E.

Take of white chalk, prepared, four ounces; nutmeg, half a dram; cinnamon, one dram. Mix and make them into a powder; which may supply the place of the cardialgic troches.

The addition of the aromatics in the above formula, coincides with the general intention of the remedy which is indicated for weakness and acidity in the stomach; and in looseness from acidity.

Compound powder of chalk with opium. L.

Take of compound powder of chalk, eight ounces; hard purified opium, powdered, one dram and an half. Mix them.

From the addition of the opium this remedy becomes still more powerful than the above in retraining diarrhoea.

Compound powder of ipecacuanha. L.

539 Take ipecacuanha and hard purified opium, of each, powdered, one dram; vitriolated kali, powdered, one ounce. Mix them.

Sudorific, or Dover's powder. E.

Take of vitriolated tartar, three drams; opium, root of ipecacuanha powdered, of each one scruple. Mix, and grind them accurately together, so as to make an uniform powder.

The vitriolated tartar, from the grittiness of its crystals, is perhaps better fitted for tearing and dividing the tenacious opium than any other salt; this seems to be its only use in the preparation. The operator ought to be careful that the opium and ipecacuanha shall be equally diffused through the whole mass of powder, otherwise different portions of the powder must have differences in degree of strength.

The hard purified opium, directed by the London college, is, from this circumstance, preferable to opium in its ordinary state, employed by the Edinburgh college.

This powder is one of the most certain sudorifics

that we know of; and as such, was recommended by Dr. Dover as an effectual remedy in rheumatism. Modern practice confirms its reputation, not only in rheumatism, but also in dropsy and sundry other diseases, where it is often difficult by other means to produce a copious sweat. The dose is from five to ten or twelve grains, according as the patient's stomach and strength can bear it. It is convenient to avoid much drinking immediately after taking it, otherwise it is very apt to be rejected by vomiting before any other effects are produced.

Compound powder of jalap. E.

Take of jalap root, one ounce; crystals of tartar, two ounces. Mix, and diligently grind them together for some time, so as to form a very fine powder. 540

The use of the crystals in this preparation is to break down and divide the jalap into very minute particles, whereby its operation is thought to be meliorated; and on this account the two articles are directed to be pounded together, and not separately. But whether from this circumstance any advantage arises or not, there can be no doubt that this combination furnishes us with a very useful and active purgative, in every case where it is necessary to produce both a full evacuation of the intestinal canal, and a free discharge from the system in general, under the form of catharsis.

Compound powder of myrrh. L.

Take of myrrh, dried safin, dried rue, Russian castor, of each, one ounce. Rub them together into a powder. 541

This is a reformation of the troches of myrrh, a composition contrived by Rhazes against uterine obstructions. It may be taken in any convenient vehicle, or made into boluses, from a scruple to a dram or more, two or three times a-day.

Opiate powder. L.

Take of hard purified opium, powdered, one dram; burnt and prepared hartshorn, nine drams. Mix them. 542

The hartshorn is here intended merely to divide the opium, and to give it the form of powder, although it may perhaps have also some influence in rendering the opium more active from destroying acid in the stomach. But whether in this way it has any effect or not, there can be no doubt that it is a very convenient formula for the exhibition of opium in powder; which on some occasions is preferable to its being given either in a liquid form or in that of pills. As ten grains of this powder contain precisely one of the opium, the requisite dose may be easily adapted to the circumstances of the case. It is often successfully employed as a sweating powder; and has not, like Dover's powder, the effect of inducing sickness or vomiting.

Compound powder of scammony.

Take of scammony, hard extract of jalap, each two ounces; ginger, half an ounce. Powder them separately, and mix them. L. 543

Take of scammony, crystals of tartar, each two ounces; mix, and grind them diligently into a powder. *E.*

It is much to be regretted, that in the pharmacopœias published by authority in Britain, two compositions should be distinguished by the same name, differing considerably from each other in their nature and degree of activity.

The compound powder of scammony in the last edition of the London pharmacopœia differed considerably from the present: For there, the only addition was calcined hartshorn, intended merely for the division of the scammony. This purpose is still better answered by the crystals of tartar, which at the same time conspire with the operation of the scammony as a purgative. But the addition of jalap and ginger, according to the present formula of the London pharmacopœia, gives not only a purgative considerably different, but increases also the heating quality of the medicine, while the cream of tartar has an evident refrigerant power. Both may on occasions be useful, but we think that in most cases the Edinburgh formula will be found preferable.

In editions of our pharmacopœias of still older date, this powder was prepared with another very active ingredient, diaphoretic antimony. It was much celebrated as distinguished by the name of its inventor, being called from its first publisher, *Cornachini's powder*. In a former edition of the Edinburgh pharmacopœia it was thus directed to be prepared:

Take of diaphoretic antimony, cream of tartar, scammony, each equal parts. Make them into a powder.

This may be given to the quantity of a dram or more. In other prescriptions, the tartar and antimonial calx bear nearly the same proportion to the scammony as the calcined hartshorn did in the London pharmacopœia. It appears probable, that neither of these ingredients are of any farther use, than as they divide the texture of the scammony; though Cornachini supposes very considerable advantage from some deobstruent quality in the tartar, whereby the vessels shall be opened, and the noxious humours prepared for expulsion; and from the preparation of antimony, though it have no sensible operation, he expects some share of the same success which sometimes attends the rougher preparations of that mineral.

Both the present formulæ may, however, be considered as possessing all the advantages of Cornachini's powder.

Powder of scammony with aloes. L.

544 Take of scammony, six drams; hard extract of jalap, socotorine aloes, of each an ounce and an half; ginger, half an ounce. Powder them separately, and mix them.

In this formula, the combination of scammony, jalap, and aloes, furnishes a very active purgative, which, with some intentions at least, may be preferable to either of the preceding. Taken from five to ten grains, it will operate as a purgative, even in cases of obstinate costiveness.

Powder of scammony with calomel. L.

545 Take of scammony, half an ounce; calomel, double-

refined sugar, of each two drams. Rub them separately to a powder, and then mix them.

In this formula, we have the scammony in a more simple state, united with such a proportion of calomel as must very considerably aid its purgative power. And accordingly it may be employed with advantage, both in cases of obstinate costiveness and in dropical affections, where a considerable discharge is required from the system.

Compound powder of senna. L.

Take senna, crystals of tartar, of each two ounces; scammony, half an ounce; ginger, two drams. Rub the scammony by itself, rub the rest together into a powder, and then mix them all.

This powder is given as a cathartic, in the dose of two scruples or a dram. The spice is added, not only to divide, but to warm the medicine, and make it sit easier on the stomach. The scammony is used as a stimulus to the senna; the quantity of the latter necessary for a dose, when not assisted by some more powerful material, being too bulky to be conveniently taken in this form.

The composition of this medicine is now considerably simplified by the rejection both of cinnamon and cloves, as the ginger alone is found fully to answer the intention in view.

Styptic powder. E.

Take of alum, an ounce and an half; gum-kino, three drams. Grind them together into a fine powder.

In former editions of our pharmacopœia, a powder of this kind was directed to be made with alum and dragon's blood, and was long in repute as an astringent, under the title of *Helvetius's styptic powder*. The gum-kino is judiciously substituted for the dragon's blood, as being a much more powerful and certain astringent. The chief use of this powder is in hæmorrhagies, especially of the uterus.

Compound powder of tragacanth. L.

Take of tragacanth powdered, gum-arabic, starch, each an ounce and a half; double-refined sugar, three ounces. Rub them together into a powder.

This composition is somewhat simplified by the rejection of the marshmallow, and liquorice-root, which formerly entered it. But this has not probably produced any diminution of its medical properties. It operates as a mild emollient; and hence becomes serviceable in hectic cases, tickling coughs, strangury, some kinds of alvine fluxes, and other disorders proceeding from a thin acrimonious state of the humours, or an abrasion of the mucus of the intestines; they soften, and give a greater degree of consistency to the former, and defend the latter from being irritated or excoriated by them. All the ingredients coincide in these general intentions. The dose is from half a dram to two or three drams, which may be frequently repeated.

Anthelmintic powder. Gen.

Take of the flowers of tansy, worm-seeds, each three drams; sal martis, one dram. Mix them.

Both

Both the tanfy and worm-feed poffefs a confiderable degree of anthelmintic power, which is not a little increased by the falt of steel. And from this combination more effect in the expulfion of worms, particularly of the lumbrici, may be expected, than from any of the articles taken by themfelves. This powder may be taken to the extent of half a dram or upwards for a dofe, proportioned to the age and circumftances of the patient.

Powder againft the bite of a mad dog. Brun.

Take of afh-coloured ground liverwort, two ounces; black pepper, one ounce. Beat them together into a powder.

The virtue for which this medicine has been celebrated, is expreffed in its title; the dofe is a dram and a half, to be taken in the morning fafting, in half a pint of cows milk warm, for four mornings together.

At one period it was held, on the recommendation of Dr Mead and other eminent practitioners, in very high efteem. Now, however, it has fallen into fuch difrepute, as to be banifhed from moft of the modern pharmacopœias.

Compound powder of arum. Succ.

Take of arum root, frefh dried, two drams; yellow water-flag roots, burnt faxifrage roots, each one dram; white canella, a dram; falt of wormwood, one fcruple. Beat them into a powder, which is to be kept in a clofe vefel.

In former editions of the London pharmacopœia, one of the ingredients in this compofition was called *acorus vulgi* or *vulgaris*; a name which has been applied, by different writers, both to *calamus aromaticus*, and to *gladiolus luteus*, or common yellow water-flag. In this uncertainty, the compounders generally took the former. But as the medicine was firft contrived by a German phyfician (Birkmann), and as in fome of the German pharmacopœias, the *acorus vulgaris* is explained to be the water-flag, the Swedifh college have rather, in conformity to the original prefcription, than from any opinion of the virtues of the water-flag (which appears, when the root is dried and powdered, to be very inconfiderable), made choice of this laft, and expreffed it by the name which more clearly diftinguiſhes it from the other. The caution of keeping the powder in a clofe vefel is very neceffary; for if it be expofed to the air, the alkaline falt, imbibing moiſture, would run into a liquid ſtate. Two alkaline falts have been generally directed; but as they differ from each other only in name, one of them is here juſtly omitted, and fupplied by a proportional increafe of the other. Crabs eyes were originally an article in this compofition, but probably ſerved little other purpoſe than to increafe its volume.

Agreeably to the above remark, the college of Edinburgh, in a revival of their pharmacopœia, had omitted the crabs-eyes, and continued the former practice of uſing *calamus aromaticus* for the *acorus vulgaris*. They had likewiſe exchanged the cinnamon for the white canella; and the alkaline falt for a neutral one, better ſuited to the form of a powder. Their formula was as follows:

Take of arum roots, newly dried, two ounces; *calamus aromaticus*, burnt faxifrage roots, each one ounce; white canella, fix drams; vitriolated tartar, two drams. Mix and make them into a powder.

This article, which had formerly a place alfo in the London pharmacopœia, is ſtill retained in ſome of the beſt foreign ones: But it is now altogether rejected from our pharmacopœias.

The compound powder of arum was originally intended as a ſtomachic: and in weakneſſes and relaxations of the ſtomach, accompanied with a ſurcharge of viſcid humours, it is doubtleſs a very uſeful medicine. It frequently has alſo good effects in rheumatic caſes: the doſe may be from a ſcruple to a dram, two or three times a day, in any convenient liquor. It ſhould be uſed as freſh as poſſible, for its virtue ſuffers greatly in keeping: the arum root in particular, its capital ingredient, ſoon loſes the pungency, in which its efficacy principally conſiſts.

Digeflive powder. Succ.

Take of bitter purging falts, rhubarb, each equal parts. Mix them.

In this compoſition, the falt will brifken the operation of the rhubarb as a cathartic, and the aſtringency of the latter will tend to increaſe the tone of the ſtomach: hence, in conſequence of evacuating, and at the ſame time ſtrengthening the alimentary canal, it may be preſumed to have conſiderable influence in promoting digeſtion.

Dyſenteric powder. Dan.

Take of rhubarb, one ounce; calcined hartſhorn, half an ounce; gum-arabic, three drams; caſcarilla bark, two drams. Mix them, and reduce them to a very fine powder.

Here the rhubarb is combined with another powerful tonic, the caſcarilla; and while the calcined hartſhorn ſerves to neutralize acid, the gum-arabic will operate as a demulcent. This compoſition therefore may be very uſeful in dyſenteric caſes, after the violence of the diſeaſe has been overcome, and when there remains a debilitated and abraded ſtate of the inteſtinal canal.

Fumigation powder. Roſſ.

Take of olibanum, amber, maſtich, each three parts; ſtorax, two parts; benzoin, labdanum, each one part. Mix them into a groſs powder.

This powder is intended for the purpoſe of fumigation; and when burnt it gives out a fragrant odour: hence it may be ſucceſſfully employed for combating diſagreeable ſmells, and counteracting putrid or other noxious vapours diffuſed in the atmoſphere.

Powder for infants. Succ.

Take of magnesia alba, one ounce; rhubarb, reduced to a very fine powder, one dram. Let them be mixed.

This powder is very uſeful for deſtroying acid, and at the ſame time reſtoring the diminiſhed tone of the alimentary canal: hence it is often advantageouſly employed in caſes of diarrhœa, which depend on theſe

Preparations and Compositions.

morbid constitutions. And it is in general a circumstance of considerable advantage, that it does not tend to the k loofens very suddenly. It is particularly useful with infants, and hence the origin of the name here affixed to it.

Nitreus powder. Succ.

- 556 Take of purified nitre, three ounces; salt of forrel, one ounce; double-refined sugar, ten ounces. Let them be mixed.

This is a very convenient and agreeable form of exhibiting nitre: for while the sugar serves not only to divide and diffuse it, but also to correct its taste, the salt of forrel adds to its refrigerant power.

Purging Peruvian powder. Gen.

- 557 Take of the powder of Peruvian bark, one ounce; powder of rhubarb, powder of sal ammoniac, each one dram and a half.

It has been imagined by many, that particular advantage resulted from uniting the Peruvian bark with sal ammoniac; and there can be no doubt, that in some cases inconvenience results from the bark, in consequence of its binding the belly. There are therefore circumstances in which the combination here proposed may perhaps be proper: but there is reason to believe that the benefit of the sal ammoniac is more imaginary than real; and it not unfrequently happens, that we are disappointed of the benefit which might otherwise be derived from the bark, in consequence of its proving even of itself a purgative. Hence, in perhaps a majority of cases, the exhibiting it with the additions here proposed will be rather prejudicial than otherwise.

Thebaic powder. Succ.

- 558 Take of opium, half a scruple; purified nitre, five scruples and a half; refined sugar, one ounce. Mix them together into a powder.

In this powder those inconveniences which sometimes result from opium may with certain constitutions be corrected, in consequence of the refrigerant power of nitre; and hence it may prove a very useful sedative powder. The sugar is intended merely to give form to the medicine; and in its state of combination, each dram of it contains a grain of opium; so that a practitioner has it in his power easily to regulate the dose according to circumstances.

Sponge-powder. Gen.

- 559 Take of burnt sponge, powdered, common salt, each three drams. Mix them, and divide into twelve powders.

We have formerly noticed the manner of burning sponge, (see n° 98.) It is of very considerable service in scrofulous affections, and particularly in the cure of the bronchocele. It has of late been highly celebrated for these purposes by Mr Wilmer, under the title of the *Coventry remedy*. There it was sometimes employed merely in its pure state, combined with a sufficient quantity of honey, its form it into a bolus; sometimes it was given united with calcined cork and pumice-stone. What advantage,

however, it could have derived from these additions it is difficult to conceive; nor can we readily see how it will be improved by the addition of common sea-salt here proposed: for this may probably lead to new combinations, materially altering the qualities of those salts which the sponge itself contains; and on which its virtues, as far as it has any, must depend. At the same time, for any experience which we ourselves have had, we are inclined to think, that those virtues which have been attributed to burnt sponge are more imaginary than real.

CHAP. XXVI. Troches.

TROCHES and lozenges are composed of powders made up with glutinous substances into little cakes, and afterwards dried. This form is principally used for the more copious exhibition of certain medicines, by fitting them to dissolve slowly in the mouth, so as to pass by degrees into the stomach; and hence these preparations have generally a considerable proportion of sugar or other materials grateful to the palate. Some powders have likewise been reduced into troches, with a view to their preparation; though possibly for no very good reasons: for the moistening, and afterwards drying them in the air, must on this account be of greater injury than any advantage accruing from this form can counterbalance.

General Rules for making Troches.

1. The three first rules laid down for making powders, are also to be observed in the powders for troches.
2. If the mass proves so glutinous as to stick to the fingers in making up, the hands may be anointed with any convenient sweet or aromatic oil; or else sprinkled with powder of starch, or of liquorice, or with flour.
3. In order to thoroughly dry the troches, put them on an inverted sieve, in a shady airy place, and frequently turn them.
4. Troches are to be kept in glass vessels, or in earthen ones well glazed.

Troches of starch. L.

Take of starch, an ounce and an half; liquorice, six drams; florentine orris, half an ounce; double refined sugar, one pound and a half. Rub these to powder, and, by the help of tragacanth, dissolved in water, make troches. They may be made, if so chosen, without the orris.

White pectoral troches. E.

Take of purest sugar, one pound; gum arabic, four ounces; starch, one ounce; flowers of benzoin, half a dram. Having beat them all into a powder, make them into a proper mass with rose-water, so as to form troches.

These compositions are very agreeable pectorals, and may be used at pleasure. They are calculated for softening acrimonious humours, and allaying the tickling in the throat which provokes coughing.

Although not only the name but the composition

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also in the London and Edinburgh pharmacopœias be somewhat different, yet their effects are very much the same.

Troches of liquorice. L.

562 Take of extract of liquorice, double-refined sugar, each ten ounces; tragacanth, powdered, three ounces. Make troches by adding water.

Black pectoral troches. E.

Take of extract of liquorice, gum arabic, each four ounces; white sugar, eight ounces. Dissolve them in warm water, and strain: then evaporate the mixture over a gentle fire till it be of a proper consistence for being formed into troches.

These compositions are designed for the same purposes as the white pectoral troches above described. In foreign pharmacopœias there are some other troches of this kind, under the titles of *Trochisci bicli flavi* and *rubri*; the first are coloured with saffron, the latter with bole armenic. The dissolving and straining the extract of liquorice and gum arabic, as now ordered in the last of the above prescriptions, is a considerable improvement; not only as they are by that means more uniformly mixed than they can well be by beating, but likewise as they are thereby purified from the heterogeneous matters, of which both those drugs have commonly no small admixture.

Pectoral troches with opium. E.

563 Take of pure opium, two drams; balsam of Peru, one dram; tincture of Tolu, three drams. Grind the opium with the balsam and tincture previously mixed, till it be thoroughly dissolved; then add by degrees, of common syrup, eight ounces; extract of liquorice, softened in warm water, five ounces. While beating them diligently, gradually sprinkle upon the mixture five ounces of powdered gum arabic. Exsiccate so as to form troches, each weighing ten grains.

The directions for preparing the above troches are so full and particular, that no farther explanation is necessary. Six of the troches prepared in the manner here ordered, contain about one grain of opium. These troches are medicines of approved efficacy in tickling coughs depending on an irritation of the fauces. Besides the mechanical effect of the inviscating matters and involving acrid humours, or lining and defending the tender membranes, the opium must, no doubt, have a considerable share, by more immediately diminishing the irritability of the parts themselves.

The composition of these troches, however, would perhaps be improved by the omission of the balsam of Peru: for although here directed only in small quantity, yet it gives a taste to the troches which is to many people very disagreeable; and it is at the same time probable that it adds very little, if any thing, to the efficacy of the medicine.

Troches of nitre.

564 Take of purified nitre, powdered, four ounces; double-refined sugar, powdered, one pound; tragacanth,

powdered, six ounces. With the addition of water, make troches. *L.*
Take of nitre, purified, three ounces; double-refined sugar, nine ounces. Make them into troches with mucilage of gum tragacanth. *E.*

This is a very agreeable form for the exhibition of nitre; though, when the salt is thus taken without any liquid (if the quantity be considerable), it is apt to occasion uneasiness about the stomach, which can only be prevented by large dilution with aqueous liquors. The troches of nitre have been said to be employed with success in some cases of difficult deglutition.

Troches of sulphur.

Take of washed flowers of sulphur, two ounces; double-refined sugar, four ounces. Rub them together; and, with the mucilage of quince seeds, now and then added, make troches. *L.*

Take of flowers of sulphur, two ounces; flowers of benzoin, one scruple; white sugar, four ounces; facitious cinnabar, half a dram. Beat them together, and add mucilage of gum tragacanth as much as is sufficient. Mix and make them into troches according to art. *E.*

These compositions are to be considered only as agreeable forms for the exhibition of sulphur, no alteration or addition being here made to its virtues; unless that, by the flowers of benzoin in the second prescription, the medicine is supposed to be rendered more efficacious as a pectoral.

The facitious cinnabar seems chiefly intended as a colouring ingredient.

Troches of chalk. L.

Take of chalk, prepared, four ounces; crabs-claws, prepared, two ounces; cinnamon, half an ounce; double-refined sugar, three ounces. These being rubbed to powder, add mucilage of gum arabic, and make troches.

Troches of magnesia. L.

Take of burnt magnesia, four ounces; double-refined sugar, two ounces; ginger, powdered, one scruple. With the addition of mucilage of gum arabic make troches.

These compositions are calculated against that uneasy sensation at the stomach, improperly called the heartburn; in which they often give immediate relief, by absorbing and neutralizing the acid juices that occasion this disorder. The absorbent powders here used are of the most powerful kind. The former has in general the effect of binding, the latter of opening, the belly; and from this circumstance the practitioner will be determined in his choice, according to the nature of the case which he may have occasion to treat.

Red lead troches. Dan.

Take of red lead, half an ounce; corrosive sublimate mercury, one ounce; crumb of the finest bread four ounces. Make them up with rose-water into oblong troches.

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These troches are employed only for external purposes as escharotics: they are powerfully such, and require a good deal of caution in their use.

Troches of catechu. Brun.

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Take of catechu, one ounce; white sugarcandy, two ounces; ambergris, musk, each ten grains; mucilage of gum tragacanth, as much as is sufficient. Make them into troches.

This medicine has long been in esteem as a slight refrigerant; and refrigerants thus gradually received into the stomach produce better effects than when an equal quantity is taken down at once. These troches would be more palatable, and perhaps not less serviceable, were the musk and ambergris omitted.

CHAP. XXVII. *Pills.*

569

To this form are peculiarly adapted those drugs which operate in a small dose, and whose nauseous and offensive taste or smell require them to be concealed from the palate.

Pills dissolve the most difficultly in the stomach, and produce the most gradual and lasting effects of all the internal forms. This is in some cases of great advantage, in others it is a quality not at all desirable; and sometimes may even be of dangerous consequence, particularly with regard to emetics; which, if they pass the stomach undissolved, and afterwards exert themselves in the intestines, operate there as violent cathartics. Hence emetics are among us scarcely ever given in pills; and hence to the resinous and difficultly soluble substances, saponaceous ones ought to be added, in order to promote their solution.

Gummy resins, and inspissated juices, are sometimes soft enough to be made into pills without addition: where any moisture is requisite, spirit of wine is more proper than syrups or conserves, as it unites more readily with them, and does not sensibly increase their bulk. Light dry powders require syrup or mucilages; and the more ponderous, as the mercurial and other metallic preparations, thick honey, conserve or extracts.

Light powders require about half their weight of syrup, of honey, about three-fourths their weight, to reduce them into a due consistence for forming pills. Half a dram of the mass will make six or seven pills of a moderate size.

General Rules for making pills.

1. Gums and inspissated juices are to be first softened with the liquid prescribed; then add the powders, and continue beating them all together till they be perfectly mixed.
2. The masses for pills are best kept in bladders, which should be moistened now and then with some of the same kind of liquid that the mass was made up with, or with some proper aromatic oil.

Ethiopic pills. E.

570

Take of quicksilver, six drams; golden sulphur of antimony, resin of guaiacum, honey, each half an ounce. Grind the quicksilver with the honey, in a glass

mortar, until the mercurial globules entirely disappear; then add the golden sulphur and guaiacum, with as much mucilage of gum arabic as is sufficient to make the mixture into a mass of the proper consistence for forming pills.

These pills are much more efficacious than those of a former edition; the ethiops mineral, there ordered, being exchanged for a more active composition. In their present form, they resemble Dr Plummer's pills, described in the Edinburgh Essays, and afterwards to be mentioned. To it they are preferable in one respect, that they are less apt to run off by stool. They are an useful alternative both in cutaneous and venereal disorders. One fourth-part of the quantity above prescribed may be made into sixty pills; of which from one to four may be taken every night and morning, the patient keeping moderately warm during the whole time that this course is continued.

Pills of aloes. L.

Take of socotorine aloes, powdered, one ounce; extract of gentian, half an ounce; syrup of ginger, as much as is sufficient. Beat them together.

571

Aloetic pills. E.

Take of socotorine aloes, in powder, thick extract of gentian, each two ounces; make them into a mass with simple syrup.

These pills were formerly directed to be made with Castile soap; from a notion which Boerhaave and some others were very fond of, that soap promoted the solution of resinous and several other substances in the stomach. This, however, seems to be a mistake; and, on the contrary, it is highly probable that the alkaline part of the soap is in most instances separated from the oily by the acid in the stomach; by which decomposition the soap may possibly retard instead of promoting the solution of the aloes. These pills have been much used as warming and stomachic laxatives: they are very well suited for the costiveness so often attendant on people of sedentary lives. Like other preparations of aloes, they are also used in jaundice, and in certain cases of obstructed menses. They are seldom used for producing full purging; but if this be required, a scruple or half a dram of the mass may be made into pills of a moderate size for one dose.

Pills of aloes with myrrh. L.

Take of socotorine aloes, two ounces; myrrh, saffron, of each one ounce; syrup of saffron, as much as is sufficient. Rub the aloes and myrrh separately to powder; afterwards beat them all together.

572

The common pills, vulgarly called Rufus's pills. E.

Take of socotorine aloes, two ounces; myrrh, one ounce; saffron, half an ounce. Beat them into a mass with a proper quantity of syrup.

These pills have long continued in practice, without any other alteration than in the syrup with which the mass is made up, and in the proportion of saffron. In our last pharmacopoeia, the syrup of wormwood was ordered, which is here judiciously exchanged by the London college for that of saffron; this preserving and

and improving the brightness of colour in the medicine, which is the characteristic of its goodness. The saffron, in the composition which is attributed to Rufus, is equal in quantity to the myrrh; and in these proportions the pill was received in our first pharmacopœia. As the diminution afterwards made in the saffron was grounded on very absurd reasons, (viz. "left the former quantity should occasion a spasmus cynicus,") the London college have now again increased it, and restored the pill to its original form. The virtues of this medicine may be easily understood from its ingredients. These pills, given to the quantity of half a dram or two scruples, prove considerably cathartic, but they answer much better purposes in smaller doses as laxatives or alteratives.

Colocynth pills with aloes, commonly called Coccie. E.

73

Take socotorine aloes, scammony, of each two ounces; sal polychrest, two drams; colocynth, one ounce; oil of cloves, two drams. Reduce the aloes and scammony into a powder with the salt; then let the colocynth, beat into a very fine powder, and the oil be added; lastly, make it into a proper mass with mucilage of gum arabic.

In these pills we have a very useful and active purgative; and where the simple aloetic pill is not sufficient for obviating costiveness, this will often effectually answer the purpose. Little of their activity can depend upon the salt which enters the composition; but it may assist in dividing the active parts of the other articles, particularly the aloes and scammony. These pills often produce a copious discharge in cases of obstinate costiveness, when taken to the extent only of five or ten grains; but they may be employed in much larger doses. They are, however, seldom used with the view of producing proper catharsis. Half a dram of the mass contains about five grains of the colocynth, ten of the aloes, and ten of the scammony.

Copper pills. E.

74

Take of cuprum ammoniacum, sixteen grains; crumb of bread, four scruples; spirit of sal ammoniac, as much as is sufficient to form them into a mass, which is to be divided into thirty-two equal pills.

These pills had formerly the name of *Pilule ceruleæ*, but they are now with greater propriety denominated from the metal which is their basis.

Each of these pills weigh about three grains, and contain somewhat more than half a grain of the cuprum ammoniacum. The above pills seem to be the best form of exhibiting this medicine. See *CUPRUM Ammoniacale*, and *CHEMISTRY*, No 1034.

Gum pills.

75

Take of galbanum, opopanax, myrrh, sagapenum, each one ounce; asafœtida, half an ounce; syrup of saffron, as much as is sufficient. Beat them together. *L.*

Take of asafœtida, galbanum, myrrh, each one ounce; rectified oil of amber, one dram. Beat them into a mass with simple syrup. *E.*

These pills are designed for antihysterics and emme-

nagogue, and are very well calculated for answering those intentions; half a scruple, a scruple, or more, may be taken every night or oftener. The fetid pills of our former pharmacopœia were considerably purgative: the purgative ingredients are now omitted, as the physician may easily, in extemporaneous prescription, compound these pills with cathartic medicines, in such proportions as particular cases shall require.

Quicksilver pills. L.

Take purified quicksilver, extract of liquorice, having the consistence of honey, of each two drams; liquorice, finely powdered, one dram. Rub the quicksilver with the extract of liquorice until the globules disappear; then, adding the liquorice-powder, mix them together.

576

Mercurial pills. E.

Take of quicksilver, honey, each one ounce; crumb of bread, two ounces. Grind the quicksilver with the honey in a glass mortar till the globules disappear, adding occasionally a little simple syrup; then add the crumb of bread, and beat the whole with water into a mass, which is to be immediately divided into four hundred and eighty equal pills.

The quicksilver was formerly directed to be ground with resin of guaiacum and Castile soap. The former was supposed to coincide with the virtues of the mercury, and the latter was used chiefly to divide the globules of mercury. For this last intention Dr Saunders found that honey, the substance here ordered by the Edinburgh college, is of all he tried the most effectual: but we would suppose with this gentleman, that something farther is done in this process than the mere division of the mercurial globules, and that part of the quicksilver is as it were amalgamated with the honey, or brought to a state similar to that in Plenck's solution. The same effect will take place when the pills are prepared with extract of liquorice now directed by the London college.

The mercurial pill is one of the best preparations of mercury, and may in general supersede most other forms of this medicine. It is necessary to form the mass immediately into pills, as the crumb soon becomes too hard for that purpose. Soap was undoubtedly a very improper medium for triturating the mercury; it is not only too hard for that purpose, but when the preparation entered the stomach, the alkaline part of the soap being engaged by the acid in that viscus, the mercury would in all probability be immediately separated. The honey and bread can only be changed by the natural powers of digestion, and can never oppress the stomach. The dose of the pills is from two to four or six in the day, according to the effects we wish to produce.

Jalap pills. E.

Take of extract of jalap, two ounces; aromatic powder, half an ounce. Beat them into a mass with simple syrup.

577

This is an useful and active purgative, either for evacuating the contents of the intestinal canal, or producing a discharge from the system in general.

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One of the same kind, with powdered jalap in substance instead of the extract, is used in some of our hospitals, as a cheap and effectual purge.

Plummer's pill. E.

- 578 Take of sweet mercury, precipitated sulphur of antimony, each six drams; extract of gentian, white Spanish soap, each two drams. Let the mercury be triturated with the sulphur till they be thoroughly mixed, then add the extract, and form a mass with simple syrup.

These pills were recommended to the attention of the public about forty years ago by Dr Plummer, whose name they still bear. He presented them in a paper which he published in the Edinburgh Medical Essays, as a very useful alterative; and on his authority they were at one time much employed: but they are now less extensively used than formerly. And although they still retain a place in the Edinburgh pharmacopœia, yet it is probable that every purpose to be answered by them may be more effectually obtained from the common mercurial pill, or from calomel in a more simple state.

Opium pills. L.

- 579 Take of hard purified opium, powdered, two drams; extract of liquorice, one ounce. Beat them until they are perfectly united.

Thebaic, commonly called Pacific pills. E.

Take of opium, half an ounce; extract of liquorice, two ounces; Castile soap, an ounce and a half; Jamaica pepper, one ounce. Soften the opium and extract separately with proof-spirit, and having beat them into a pulp, mix them; then add the soap, and the pepper beat into a powder; and lastly, having beat them well together, form the whole into a mass.

These two compositions, though differing in several particulars, may yet be considered as fundamentally very much the same. The first is a simple opiate, in which every five grains of the mass contains one of opium; and in the opium alone can we suppose that the activity of the medicine depends.

Although some of the articles contained in the latter composition may perhaps be supposed to operate as corrigentia, yet the former composition, which is the most simple, is in general preferable.

Pills similar to the second were contrived by a chemical empiric, Starkey, and communicated by him to Matthews, under whose name they were some time ago greatly celebrated. The form here given differs considerably from the original, in omitting many ingredients of no great service. Nor indeed are any of the ingredients of much consequence, except the opium; their quantity being too inconsiderable to answer any useful purpose. Ten grains of the composition contain one of opium.

Squill-pills.

- 580 Take of fresh dried squills, powdered, one dram; ginger powdered, soap, of each three drams; ammoniacum, two drams; syrup of ginger, as much as is sufficient. Beat them together. *A.*

Take of gum ammoniac, lesser cardamom seeds, in powder, extract of liquorice, each one dram; dried root of squills, in fine powder, one scruple. Mix, and form them into a mass with simple syrup. *E.*

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These are elegant and commodious forms for the exhibition of squills, whether for promoting expectoration, or with the other intentions to which that medicine is applied. As the virtue of the compound is chiefly from the squills, the other ingredients are often varied in extemporaneous prescription: and probably no material difference takes place in the two forms here proposed excepting in the proportion of the squills, which in the former constitutes one ninth, in the latter one tenth, of the mass.

Stomachic pills. E.

Take of rhubarb, one ounce; socotorine aloes, six drams; myrrh, half an ounce; vitriolated tartar, one dram; essential oil of mint, half a dram; syrup of orange peel, a sufficient quantity. Make them into a mass.

581

This pill is intended for moderately warming and strengthening the stomach, and evacuating crude viscid humours. A scruple of the mass may be taken twice a day.

Bacher's pill. Gen.

Take of extract of black hellebore, purified myrrh, each one ounce; powder of carduus benedictus, two scruples. Mix them into a mass according to art, to be dried in the air till it be fit for the formation of pills, each weighing one grain.

582

These pills have been strongly recommended as a most effectual remedy in dropical cases, and have been alleged to unite an evacuant and tonic power. Hence they have been considered as particularly suited to those cases where remarkable weakness and laxity occur. Under the hands of Mr Bacher the inventor, they acquired so great reputation, that, after a trial in the military hospitals at Paris, the receipt was purchased by the French king, and published by authority. But like many other nostrums since this publication, Bacher's pill has by no means supported the reputation which it had when kept a secret. The dose is varied according to circumstances, from one to thirty pills taken in the course of the day.

Pills of elaterium. Succ.

Take of the purest gum ammoniac, two ounces; socotorine aloes, gamboge, each two drams; elaterium, half a dram. Mix them, by means of bitter tincture, into a mass, and let pills be formed, each weighing two grains.

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This, as well as the former, is also a pill celebrated for the cure of dropical affections. And the elaterium, from which it derives its name, is one of the most powerful evacuants in the way of catharsis. Here, however, it is united with such active articles, particularly the gamboge, as must make its effect somewhat doubtful. And we are inclined to think that a preferable formula for making the pills of elaterium, is to form it into a mass, with the extract of gentian. This is imagined to have some influence as correcting its effect,

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in exciting sickness. And when each pill is made to contain but a grain of the elaterium, the dose may be easily accommodated to the circumstances of the patient, one or two pills being taken every hour till they begin to operate.

The elaterium, whether under the form above-mentioned, or in the more simple state which has now been suggested, operates as a very powerful cathartic, often inducing the discharge of stagnant serum, when other remedies are found ineffectual. But it can be exhibited only in those cases where the patient still retains a considerable degree of strength.

Fetid pills. Succ.

584

Take of asafetida, castor, each a dram and a half; salt of amber, half a dram; oil of hartshorn, half a scruple. Make them into a mass, with tincture of myrrh, to be divided into pills of two grains each.

These, like the gum-pills formerly mentioned, are chiefly used as an antihysterical and antispasmodic medicine; and they are particularly useful in counteracting spasmodic affections of the alimentary canal, especially those connected with flatulence. But the asafetida is no less successful when exhibited in a more simple state, particularly when formed into pills with an equal quantity of soap, by the aid of simple tymp.

Gamboge pills. Dan.

585

Take of socotorine aloes, extract of black hellebore, sweet mercury, gamboge, each two drams; distilled oil of juniper, half a dram; syrup of buckthorn, as much as is sufficient for forming a mass of pills.

From the ingredients of which these pills are constituted, we need hardly remark, that they must prove a very powerful purgative. The gamboge, from which they derive their name is unquestionably a very active purge. But it is not more so than the sweet mercury; and perhaps from an union of these two, as much might be expected as from the more compounded formula here adopted. Yet it is not improbable that the essential oil of juniper may in some degree operate as a corrigent.

Pills of corrosive sublimate mercury. Succ.

586

Take of corrosive sublimate, purified sal ammoniac, each one scruple; distilled water, as much as is sufficient to dissolve them; powder of the root of althea, sixteen scruples; honey, two drams. Mix them into a mass for the formation of pills, each weighing three grains.

Corrosive sublimate in substance was long considered as being so violent in its effects, that it could not with safety be taken internally; but for a considerable time it has been used with advantage under the form of solution, either in water or spirits. But to both these a considerable objection occurs from their disagreeable brassy taste. This objection is however entirely obviated, by reducing the solution, after it is formed, to a solid mass, by means of crumb of bread, or any proper powder; and by the aid of a little sal ammoniac, the solution may be made in a very small quantity of water; so that less of any solid in-

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termedium will be sufficient to bring it to the form of pills. The formula here directed seems well suited for the purpose intended. Each of the pills contains about an eighth of a grain of the corrosive; thus the dose may be easily regulated according to the intention in view. And these pills are not unfrequently employed with advantage, both in combating venereal and cutaneous affections, and for the expulsion of worms from the alimentary canal. With the latter of these intentions, a similar pill was particularly recommended by Dr Gardner, in a paper published in the Edinburgh Physical and Literary Essays: and although not received into our pharmacopœia, it has been frequently used at Edinburgh.

Tar pills. Dan.

Take any quantity of tar, and mix with it as much powdered elecampane root as will reduce it to a proper thickness for being formed into pills.

The powder here mixed with the tar, though of no great virtue, is nevertheless a very useful addition, not only for procuring it a due consistence, but likewise as it divides the resinous texture of the tar, and thus contributes to promote its solution by the animal juices. In the Edinburgh infirmary, half a dram of the mass, made into middle-sized pills, is given every morning and evening in disorders of the breast, scurvy, &c.

Soap-pills. Succ.

Take of hard white soap, two ounces; extract of birch, one ounce. Let them be formed into a mass, to be divided into pills, each containing three grains.

Although many virtues have been attributed to the birch, yet we are inclined to think, that it here serves little other purpose than to give the form of pills to the soap. And this article, even when taken in small quantity with some constitutions, operates as a gentle laxative. But besides this, it has also been supposed to be highly useful both in cases of jaundice and of calculus. There can, however, be little doubt, that the theories on which it has been inferred that it may be useful in such complaints are not well founded; and we may perhaps add, that the use of it, even to a great extent, is by no means attended with those consequences which were once alleged to arise from it.

Storax pills. Succ.

Take of strained storax, five scruples; extract of liquorice, three drams; opium, one dram. Let the opium, dissolved in wine, be added to the other ingredients, so as to form a mass of proper consistence, to be made into pills, each weighing three grains.

These pills are principally active in consequence of the opium which they contain. And they are chiefly meant with a view to a slow solution in the stomach, and consequently producing more gradual and lasting effects. One grain of opium is contained in seventeen grains of the mass.

CHAP. XXVIII. *Electuaries.*

ELECTUARIES are composed chiefly of powders mixed up with syrups, &c. into such a consistence that

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the powders may not separate in keeping, that a dose may be easily taken upon the point of a knife, and not prove too stiff to swallow.

Electuaries receive chiefly the milder alterative medicines, and such as are not ungrateful to the palate. The more powerful drugs, as cathartics, emetics, opiates, and the like (except in officinal electuaries to be dispensed by weight), are seldom trusted in this form, on account of the uncertainty of the dose; disgusting ones, acrids, bitters, fetids, cannot be conveniently taken in it; nor is the form of an electuary well fitted for the more ponderous substances, as mercurials, these being apt to subside in keeping, unless the composition be made very stiff.

The lighter powders require thrice their weight of honey, or syrup boiled to the thickness of honey, to make them into the consistence of an electuary; of syrups of the common consistence, twice the weight of the powder is sufficient.

Where the common syrups are employed, it is necessary to add likewise a little conserve, to prevent the compound from drying too soon; electuaries of Peruvian bark, for instance, made up with syrup alone, will often in a day or two grow too dry for taking.

Some powders, especially those of the less grateful kind, are more conveniently made up with mucilage than with syrup, honey, or conserve. The three latter stick about the mouth and fauces, and thus occasion the taste of the medicine to remain for a considerable time; while mucilages pass freely, without leaving any taste in the mouth. A little soft extract of liquorice, joined to the mucilage, renders the composition sufficiently grateful, without the inconveniences of the more adhesive sweets.

The quantity of an electuary, directed at a time, in extemporaneous prescription, varies much according to its constituent parts, but it is rarely less than the size of a nutmeg, or more than two or three ounces.

General rules for making electuaries.

- I. The rules already laid down for decoctions and powders in general, are likewise to be observed in making decoctions and powders for electuaries.
- II. Gums, inspissated juices, and such other substances as are not pulverizable, should be dissolved in the liquor prescribed: then add the powders by little and little, and keep the whole briskly stirring, so as to make an equable and uniform mixture.
- III. Astringent electuaries, and such as have pulps of fruit in their composition, should be prepared only in small quantities at a time: for astringent medicines lose much of their virtue on being kept in this form, and the pulps of fruits are apt to become sour.
- IV. The superfluous moisture of the pulps should be exhaled over a gentle fire, before the other ingredients are added to them.
- V. Electuaries, if they grow dry in keeping, are to be reduced to a due consistence, with the addition of a little Canary wine, and not with syrup or honey: by this means the dose will be the least uncertain; a circumstance deserving particular regard, in those especially which are made up with syrup, and contain a proportion of opium.

Electuary of cassia. L.

Take of the fresh extracted pulp of cassia, half a pound; manna, two ounces; pulp of tamarinds, one ounce; rose-syrup, half a pound. Beat the manna, and dissolve it over a slow fire in the rose-syrup; then add the pulps; and with a continued heat evaporate the whole to the proper thickness of an electuary.

Electuary of cassia, commonly called diacassia. E.

Take of pulp of cassia fistularis, six ounces; pulp of tamarinds, manna, each an ounce and a half; syrup of pale roses, six ounces. Having beat the manna in a mortar, dissolve it with a gentle heat in the syrup; then add the pulps, and evaporate them with a regularly continued heat to the consistence of an electuary.

These compositions are very convenient officinals, to serve as a basis for purgative electuaries and other similar purposes; as the pulping a small quantity of the fruits, for extemporaneous prescription, is very troublesome. The tamarinds give them a pleasant taste, and do not subject them, as might be expected, to turn sour. After standing for four months, the composition has been found no sourer than when first made. This electuary likewise is usefully taken by itself, to the quantity of two or three drams occasionally, for gently loosening the belly in colic habits.

Electuary of scammony. L.

Take of scammony, in powder, one ounce and an half; cloves, ginger, of each six drams; essential oil of caraway, half a dram; syrup of roses, as much as is sufficient. Mix the spices, powdered together, with the syrup; then add the scammony, and lastly the oil of caraway.

This electuary is a warm brisk purgative. It is a reform of the *electuarium caryocoffinum* of our preceding dispensatories; a composition which was greatly complained of, as being inconvenient to take on account of the largeness of its dose. A dram and a half of this, which contains fifteen grains of scammony, is equivalent to half an ounce of the other.

Electuary of senna. L.

Take of senna, eight ounces; figs, one pound; pulp of tamarinds, of cassia, of prunes, each half a pound; coriander seeds, four ounces; liquorice, three ounces; double-refined sugar, two pounds and an half. Powder the senna with the coriander seeds, and sift out ten ounces of the mixed powder. Boil the remainder with the figs and liquorice, in four pints of distilled water, to one half; then press out and strain the liquor. Evaporate this strained liquor to the weight of about a pound and an half; then add the sugar, and make a syrup; add this syrup by degrees to the pulps, and lastly mix in the powder.

Lenitive electuary. E.

Take of pulp of French prunes, one pound; pulp of cassia, pulp of tamarinds, each two ounces and a half; black syrup of sugar, commonly called *molasses*, one pound and a half; senna leaves, in fine powder, four

four ounces; coriander seeds, in fine powder, half an ounce. Having boiled the pulps with the syrup to the consistence of honey, add the powders, and beat the whole into an electuary.

This electuary, the name of which is with propriety changed by the London college, is now freed from some superfluous ingredients which were left in it at former revisions, viz. polypody root, French mercury leaves, fenugreek seeds, and linseed. Molasses is preferable to either honey or sugar, as it coincides with the intention, and is not only of itself inapt to ferment, but likewise prevents such substances as are this way disposed from running into fermentation.

It is a very convenient laxative, and has long been in common use among practitioners. Taken to the quantity of a nutmeg or more, as occasion may require, it is an excellent laxative for loosening the belly in costive habits.

Japonic electuary, commonly called *Japonic confection*. E.

594 Take of Japan earth, four ounces; gum-kino, three ounces; cinnamon, nutmeg, each one ounce; opium diffused in a sufficient quantity of Spanish white wine, one dram and a half; syrup of dried roses, boiled to the consistence of honey, two pounds and a quarter. Mix and form them into an electuary.

The ingredients in this electuary seem extremely well chosen, and are so proportioned to one another, that the quantity of opium is the same as in the dia-cordium of the former pharmacopœias of Edinburgh, viz. one grain in ten scruples. The gum-kino, now substituted for the tormentil root, is an excellent improvement in the formula.

Tin electuary. Brun.

595 Take of pure tin, quicksilver, each one ounce. Let them be formed into an amalgam; oyster-shells, prepared, one ounce. Reduce the whole to a powder. Take of this powder, conserve of wormwood, each one ounce, and form an electuary with syrup of mint.

Tin, as we have already had occasion to observe above (nº 312.), has long been celebrated for the expulsion of tania; and it is also well known, that in mercury we have one of the most powerful anthelmintics. Such a combination as the present, then, might be supposed well suited for the removal of that animal from the alimentary canal; and accordingly it has been alleged, that this electuary has sometimes succeeded after other remedies have failed. It may be taken twice a-day, to the extent of two or three drams for a dose.

Electuary for the gums. Suec.

596 Take of powdered myrrh, three drams; cream of tartar, cochineal, each a dram and a half. Grind them together in a glass mortar; then add melted honey, four ounces; cloves, in powder, one dram.

Myrrh, particularly under the form of tincture, has long been a favourite application to the gums, when in a spongy or ulcerated state. But the spirituous menstruum there employed, although sometimes favouring the intention in view, in other instances occurs as an objection to its use. In these cases, the benefit to be

derived from the myrrh may be obtained from this electuary, which may always be applied with safety, and sometimes with advantage.

Electuary of manna. Suec.

Take of manna, refined sugar pounded, fennel-water, each two ounces. Strain the mixture, using expression; then add fine powder of the root of florentine orris, one dram; fresh drawn almond oil, one ounce.

In this electuary we have a gently emollient laxative, which is very useful in those cases where obstipation either arises from indurated feces, or is supported by that cause. But its cathartic powers are by no means considerable.

Nitrous electuary. Gen.

Take of purified nitre, half an ounce; conserve of roses, four ounces. Mix them.

Under this formula nitre may be introduced to a considerable extent, without giving uneasiness at stomach, while at the same time its refrigerant power is combined with the astringency of the roses. From these circumstances it may be advantageously employed in different cases, but particularly in instances of hæmoptysis.

Terebinthinate electuary. Suec.

Take of spirit of turpentine, half an ounce; honey, one ounce; powder of liquorice, as much as is sufficient for the formation of an electuary.

Under this form, the oil of turpentine may be introduced with less uneasiness than perhaps under almost any other. And it may thus be employed for different purposes, but particularly with a view to its diuretic power. But it has been especially celebrated for the cure of obstinate rheumatism, and above all, for that modification of rheumatism which has the name of *ischias*, and which is found in many instances obstinately to resist other modes of cure.

Lenient linctus. Suec.

Take of gum-arabic, bruised, two drams; cherry-water, half an ounce. By trituration in a mortar, mix with them almond oil, fresh drawn, syrup of almonds, each seven ounces.

In this we have a very agreeable emollient linctus, highly useful in recent catarrhal affections, for lubricating the throat and fauces. It may be taken at pleasure to any extent that the stomach may easily bear.

CHAP. XXIX. *Confections*.

ALTHOUGH the London college have separated these from electuaries, yet they differ so little, that in most pharmacopœias they are ranked under the same head. And in that of Edinburgh, there are several articles which have promiscuously the name either of *confection* or *electuary*. But as no inconvenience arises from the separation, and as we have followed the order of the London pharmacopœia in other particulars, it would be improper to deviate from it in this.

Aromatic confectio. L.

Take of zedoary, in coarse powder, saffron, of each half a pound; distilled water, three pints. Macerate for twenty-four hours; then press and strain. Reduce the strained liquor, by evaporation, to a pint and a half, to which add the following, rubbed to a very fine powder; compound-powder of crab-claws, sixteen ounces; cinnamon, nutmegs, of each two ounces; cloves, one ounce; smaller cardamom-seeds, hulled, half an ounce; double-refined sugar, two pounds. Make a confectio.

This confectio is composed of the more unexceptionable ingredients of a composition formerly held in great esteem, and which was called, from its author, *confectio Raleighana*. The original confectio was composed of no less than five and twenty particulars; each of which were examined apart, except one, moor-grass, the flower of which is too small to be gathered in sufficient quantity for the general use of the medicine, and the plant is possessed of hurtful qualities, as is experienced in cattle that feed where it grows. In this examination, many of the extracts came out so very nauseous, that it was impossible to retain them, consistent with any regard to the taste of the composition. But some few, of equal efficacy with any of the rest, being of a tolerable taste and flavour, were compounded in different proportions; and when, after many trials, a composition was approved, the quantity of each material, that would yield the proportion of extract which entered that composition, was calculated, and from thence the proportions were collected as now set down: after which the compound extract was made, and found to answer expectations. The London college, in the present edition of their pharmacopœia, have still farther simplified this formula, by rejecting the rosemary, juniper, and cardamoms, which formerly entered it.

The confectio, as now reformed, is a sufficiently grateful and moderately warm cordial; and frequently given with that intention, from eight or ten grains to a scruple or upwards, in boluses or draughts. The formula might perhaps be still more simplified without any loss. The crab-claw powder does not appear to be very necessary, and is inserted rather in compliance with the original formula, than from its contributing any thing to the intention of the medicine; and the following formula of the Edinburgh pharmacopœia seems to us preferable to that of the London, even in its present improved state.

Cordial electuary, commonly called cordial confectio. E.

603 Take of conserve of orange-peel, three ounces; preserved nutmegs, an ounce and a half; preserved ginger, six drams; cinnamon, in fine powder, half an ounce; syrup of orange peel, as much as will form the whole into an electuary.

In the above simple and elegant formula, a number of trifling ingredients are rejected, and those substituted in their place are medicines of approved efficacy. We therefore consider this preparation as an useful remedy for the purposes expressed in its title.

Confectio of opium. L.

604 Take of hard purified opium, powdered, six drams;

long pepper, ginger, caraway-seeds, of each two ounces; syrup of white poppy, boiled to the consistence of honey, three times the weight of the whole. Mix the purified opium carefully with syrup gently heated; then add the rest, rubbed to powder.

Thebaic electuary. E.

Take of aromatic powder, six ounces; Virginian snake-root, in fine powder, three ounces; opium diffused in a sufficient quantity of Spanish white wine, three drams; clarified honey, thrice the weight of the powders. Mix them, and form an electuary.

These compositions consist of very powerful ingredients, and are doubtless capable of answering every end that can be reasonably expected from the more voluminous *Theriaca* of Andromachus. The London college also had formerly their *Theriaca* composed of the less exceptionable ingredients of Andromachus's. But as these medicines have for a long time been chiefly employed for external purposes, by the way of cataplasm, the London theriaca is now omitted, and its place supplied by a cataplasm composed of a few well-chosen articles, under the name of *cataplasm of cummin*; of which hereafter. For internal use, none of the theriacas are at present so much regarded as they have been heretofore; practitioners having introduced in their room extemporaneous boluses of Virginian snake-root, camphor, contrayerva, and the like; which answer all their intentions, with this advantage, that they may be given either with or without opium; an ingredient which renders the others prejudicial in cases where they might otherwise be proper.

With regard to the quantity of opium in the foregoing compositions, one grain thereof is contained in thirty-six grains of the confectio of opium, and in five scruples of the thebaic electuary. The proportion of opium will vary a little, according to the time that they have been kept; their moisture by degrees exhaling, so as to leave the remainder stronger of the opium than an equal weight was at first. A change of this kind is taken notice of by many writers, but falsely attributed to an imaginary fermentative quality of the ingredients; by which they were supposed, from their multiplicity and contrariety, to be continually exalting and improving the virtues of each other.

A good deal of care is requisite in making these compositions, to prevent the waste which is apt to happen in the pounding, and which would render the proportion of opium to the other ingredients precarious. The intention of dissolving the opium in wine, for these and other electuaries, is, that it may be more uniformly mixed with the rest.

These compositions fully supply the place of two articles, which, though long banished from the shops, we shall here subjoin, as examples of the amazing height to which composition in medicine had at one time proceeded.

Mithridate, or the confectio of Democrates.

Take of cinnamon, fourteen drams; myrrh, eleven drams; agaric, Indian nard, ginger, saffron, seeds of mithridate mustard, frankincense, chio turpentine, each ten drams; camels hay, costus, or in its stead zedoary, Indian leaf, or in its stead mace, stechas long

long pepper, hartwort seeds, hypocistis, storax strained, opoponax, galbanum strained, opobalsam, or in its stead expressed oil of nutmegs, Russian castor, each one ounce; Poley mountain, scordium, carpobalsam, or in its stead cubebs, white pepper, candy-carrot seed, bdellium strained, each seven drams; Celtic nard, gentian root, dittany of Crete, red roses, Macedonian parsley seed, lesser cardamom seeds husked, sweet fennel seed, gum arabic, opium strained, each five drams; calamus aromaticus, wild valerian root, aniseed, sagapenum strained, each three drams; meum athamanticum, St John's wort, acacia, or in its stead terra Japonica, bellies of skinks, each two drams and a half; clarified honey, thrice the weight of all the other ingredients. Warm the honey, and mix with it the opium dissolved in wine; melt the storax, galbanum, turpentine, and opobalsam (or expressed oil of nutmegs), together in another vessel, continually stirring them about, to prevent their burning; with these so melted, mix the hot honey, at first by spoonfuls, and afterwards in larger quantities at a time; when the whole is grown almost cold, add by degrees the other spices reduced into powder.

Theriaca of Andromachus, or Venice treacle.

Take of troches of squills, half a pound; long pepper, opium strained, vipers dried, each three ounces; cinnamon, opobalsam, or in its stead expressed oil of nutmegs, each two ounces; agaric, Florence orris root, scordium, red roses, nawew seeds, extract of liquorice, each an ounce and a half; Indian nard, saffron, amomum, myrrh, costus, or in its stead zedoary, camel's hay, each one ounce; cinquefoil root, rhubarb, ginger, Indian leaf, or in its stead mace, dittany of Crete, horehound leaves, calamint leaves, stechas, black pepper, Macedonian parsley seed, olibanum, chio turpentine, wild valerian root, each six drams; gentian root, Celtic nard, spignel, leaves of Poley mountain, of St John's wort, and of groundpine, germander tops with the seed, carpobalsam, or in its stead cubebs, aniseed, sweet fennel seed, lesser cardamom seeds, husked, seeds of bishop's weed, of hartwort, and of treacle mustard, hypocistis, acacia, or in its stead Japan earth, gum arabic, storax strained, sagapenum strained, terra Lemnia, or in its stead bole armenic, or French bole, green vitriol calcined, each half an ounce; small (or in its stead the long) birthwort root, lesser centaury tops, candy-carrot seed, opopanax, galbanum, strained, Russian castor, Jews pitch, or in its stead white amber prepared, calamus aromaticus, each two drams; clarified honey, thrice the weight of all the other ingredients. Let these ingredients be mixed together, after the same manner as directed in making the mithridate.

These celebrated electuaries are often mentioned by medical writers, and may serve as examples of the wild exuberance of composition which the superstition of former ages brought into vogue. The theriaca is a formation of mithridate made by Andromachus physician to Nero. The mithridate itself is said to have been found in the cabinet of Mithridates king of Pontus. The first publishers of this pompous arcanum were very extravagant in their commendations of its

virtues; the principal of which was made to consist in its being a most powerful preservative against all kinds of venom; whoever took a proper quantity in a morning was insured from being poisoned during that whole day. This was confirmed by the example of its supposed inventor, who, as Celsus informs us, was by its constant use so fortified against the commonly reputed poisons, that none of them would have any effect upon him when he wanted their assistance. But the notions of poisons which prevailed in those ruder ages were manifestly erroneous. Before experience had furnished mankind with a competent knowledge of the powers of simples, they were under perpetual alarms from an apprehension of poisons, and busied themselves in contriving compositions which should counteract their effects, accumulating together all those substances which they imagined to be possessed of any degree of alexipharmac power. Hence proceed the voluminous antidotes which we meet with in the writings of the ancient physicians; yet it does not appear that they were acquainted with any real poison except the cicuta, aconitum, and bites of venomous animals; and for these they knew of no antidote whatever. Even admitting the reality of the poisons, and the efficacy of the several antidotes separately, the compositions could no more answer the purposes expected from them, than the accumulating of all the medicinal simples into one form could make a remedy against all diseases.

Yet notwithstanding the absurdity in the original intention of these medicines, and their enormity in point of composition, as they contain several powerful materials, whose virtues, though greatly prejudiced, yet are not destroyed, by their multiplicity and contrariety; the compounds have been found, from repeated experience, to produce very considerable effects as warm opiate diaphoretics.

These compositions might without doubt be lapt of numerous superfluities without any diminution of their virtues; yet as the effects of them, in their present form, are so well known, so much regard has been paid to ancient authority as not to attempt a reformation of that kind. Although these forms were originally complex, yet subsequent additions had crept into them. Neither the description in verse of the elder Andromachus, nor the prose explanation of the younger, make any mention of the white pepper afterwards added to the theriaca; and the orris root, in the mithridate of our former pharmacopœias, is also a supernumerary ingredient, not warranted by the original: these therefore are rejected. Nor is the asarum in the mithridate grounded on any good authority: the verse it is taken from is mutilated and corrupt; and the word which some, on conjecture only, suppose to have been asarum, others, also on conjecture, choose to read differently. Till some emendation shall be better founded than merely on critical guesses, this single species may be safely passed over without any prejudice to the medicine. None of the ancient descriptions afford any other light in this particular; for they either omit this ingredient, and others also, or abound with additions.

Another innovation on both these medicines also took place. In each of these compositions were found both cinnamon and cassia lignea; and it is very evident,

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from several parts of Galen's works, that the latter was used by the ancients only on account of the great difficulty of procuring the other; so that to retain the cassia, now that cinnamon is so common, is a kind following of these writers, without any attention to their meaning: the cassia therefore is now rejected, and half the quantity of cinnamon put in its room; which is the proportion that Galen directs to be observed in substituting the one for the other. It is probable that the case is the same with regard to the Celtic and the Indian nard; that the first had a place in these compositions on account of the difficulty of procuring the Indian, for Galen expressly prefers the latter.

There is a material error in regard to the theriaca, which has passed through several editions of our pharmacopœia: this is the substituting the Roman vitriol for the ancient chalcitis, now not certainly known; and, in the catalogue of simples, describing the Roman to be a blue vitriol, whereas the Italian writers are unanimous it is a green vitriol; and were it not, it would not answer to the effects of the chalcitis, which was certainly a chalybeate, and gives the medicine its black colour. What has chiefly occasioned chalcitis to be supposed a cupreous vitriol seems to be its name, derived from *χάλυξ*, *copper*: but it is to be observed that all vitriols were formerly imagined to proceed from copper, and were named accordingly: the green or martial vitriols are still called by the Germans *kupfer-sulfer*, and by us *copperas*. It is probable that the ancient chalcitis was no other than a native martial vitriol, calcined by the heat of those warm climates to a degree of yellowish red or coppery colour; and therefore the common green vitriol, thus calcined by art, very properly supplies its place.

The preparation of these medicines has been somewhat facilitated by omitting the *trochisci cythereos* used in the mithridate, and the *bedyehroi* and *viperini* for the theriaca; and inserting their ingredients, after Zwelfer's manner, in the compositions they are intended for. This is done in the theriaca very commodiously; the ingredients in these troches uniting with those in the theriaca itself into unbroken numbers. But to render the numbers equally simple in the mithridate, it was necessary to retrench a few odd grains from some of the articles, and make a small addition to some others. The proportions of the ingredients in the *trochisci cythereos* are adjusted from the original description in Galen, the numbers in our former pharmacopœia being very erroneous.

Both the London and Edinburgh colleges ventured at length to discard these venerable relics. The Edinburgh college at first substituted in their room an elegant and simple form, equivalent to them both in efficacy, under the title of *theriaca Edinensis*, Edinburgh theriaca. In later editions, however, they have entirely banished the name of theriaca from their book, and have put in its place the more elegant composition already mentioned, the *thecaica electuary*.

CHAP. XXX. Medicated Waters.

606

We have already taken notice of many articles which are either dissolved in water, or communicate their virtues to it; and in one sense of the word these

may be called *medicated waters*. Sometimes this impregnation is effected by the aid of heat, sometimes without it; and thus are formed decoctions, infusions, and the like. But among those articles referred to in this chapter, there takes place mere watery solution only, and they are used solely with the intention of acting topically in the way of lotion, injection, or at the utmost of gargism.

Compound alum water. L.

Take of alum, vitriolated zinc, each half an ounce; boiling distilled water, two pints. Pour the water on the salts in a glass vessel, and strain.

607

This water was long known in our shops under the title of *agua aluminosa Baleana*.

Bates directed the salts to be first powdered and melted over the fire: but this is needless trouble, since the melting only evaporates the aqueous parts, which are restored again on the addition of the water. This liquor is used for cleansing and healing ulcers and wounds; and for removing cutaneous eruptions, the part being bathed with it hot three or four times a-day. It is sometimes likewise employed as a collyrium; and as an injection in the gonorrhœa and fluor albus, when not accompanied with virulence.

Styptic water. E.

Take of blue vitriol, alum, each three ounces; water, two pounds. Boil them until the salts be dissolved; then filter the liquor, and add an ounce and an half of vitriolic acid.

608

This water, though made with the blue in place of the white vitriol, cannot be considered as differing very much from the former. It is formed on the styptic recommended by Sydenham for stopping bleeding at the nose, and other external hemorrhagies; for this purpose cloths or doffils are to be dipt in the liquor, and applied to the part.

Water of ammoniated copper. L.

Take of lime-water, one pint; sal ammoniac, one dram. Let them stand together, in a copper vessel, till the ammonia be saturated.

609

Sapphire-coloured water. E.

Take of lime-water, newly made, eight ounces; sal ammoniac, two scruples; verdegriis, powdered, four grains. Mix them, and after 24 hours strain the liquor.

This is a much more elegant and convenient method than the preceding.

This water is at present pretty much in use as a detergent of foul and obstinate ulcers, and for taking away specks or films in the eyes. The copper contributes more to its colour than to its medicinal efficacy; for the quantity of the metal dissolved is extremely small.

Compound water of acetated litharge. L.

Take of acetated water of litharge, two drams; distilled water, two pints; proof-spirit, two drams. Mix the spirit with the acetated water of litharge; then add the distilled water.

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This liquor is of the same nature with solutions of sugar of lead, and is analogous to the vegeto-mineral water of Mr Goulard. It is only used externally as a cosmetic against cutaneous eruptions, redness, inflammation, &c. But even here it is alleged that it is not altogether void of danger, and that there are examples of its continued employment having occasioned sundry ill consequences. But at the same time the very frequent use that is made of it with perfect impunity would lead us to conclude that in these observations there must be some mistake.

Water of vitriolated zinc with camphor. L.

611

Take of vitriolated zinc, half an ounce; camphorated spirit, half an ounce; boiling water, two pints. Mix, and filter through paper.

This is an improved method of forming the vitriolic camphorated water of the former editions of the London pharmacopœia. It is used externally as a lotion for some ulcers, particularly those in which it is necessary to restrain a great discharge. It is also not unfrequently employed as a collyrium in some cases of ophthalmia, where a large discharge of watery fluid takes place from the eyes, with but little inflammation. But when it is to be applied to this tender organ, it ought, at first at least, to be diluted by the addition of more water.

Vitriolic water. E.

612

Take of white vitriol, sixteen grains; water, eight ounces; weak vitriolic acid, sixteen drops. Dissolve the vitriol in the water, and then adding the acid, strain through paper.

Where the eyes are watery or inflamed, this solution of white vitriol is a very useful application. The slighter inflammations will frequently yield to this medicine without any other assistance; in the more violent ones, venesection and cathartics are to be premised to its use.

CHAP. XXXI. *Plasters.*

613

PLASTERS are composed chiefly of oily and unctuous substances, united with powders into such a consistence that the compound may remain firm in the cold without sticking to the fingers; that it may be soft and pliable in a low degree of heat, and that by the warmth of the human body it be so tenacious as readily to adhere both to the part on which it is applied and to the substance on which it is spread.

There is, however, a difference in the consistence of plasters, according to the purposes they are to be applied to: thus, such as was intended for the breast and stomach should be very soft and yielding, while those designed for the limbs are made firmer and more adhesive. An ounce of expressed oil, an ounce of yellow wax, and half an ounce of any proper powder, will make a plaster of the first consistence: for a hard one, an ounce more of wax, and half an ounce more of powder, may be added. Plasters may likewise be made of resins, gummy resins, &c. without wax, especially in extemporaneous prescription: for officinals these compositions are less proper, as they soon grow too soft in keeping, and fall flat in a warm air.

It has been supposed, that plasters might be impregnated with the specific virtues of different vegetables, by boiling the recent vegetable with the oil employed for the composition of the plaster. The coction was continued till the herb was almost crisp, with care to prevent the matter from contracting a black colour: after which the liquid was strained off, and set on the fire again, till all the aqueous moisture had exhaled. We have already observed, that this treatment does not communicate to the oils any very valuable qualities, even relative to their use in a fluid state: much less can plasters, made with such oils, receive any considerable efficacy from the herbs.

Prepara-
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Composi-
tions.

Calces of lead, boiled with oils, unite with them into a plaster of an excellent consistence, and which makes a proper basis for several other plasters.

In the boiling of these compositions, a quantity of water must be added, to prevent the plaster from burning and growing black. Such water, as it may be necessary to add during the boiling, must be previously made hot; for cold liquor would not only prolong the process, but likewise occasion the matter to explode, and be thrown about with violence, to the great danger of the operator: this accident will equally happen on the addition of hot water, if the plaster be extremely hot.

Ammoniacum plaster with quicksilver. L.

Take of strained ammoniacum, one pound; purified quicksilver, three ounces; sulphurated oil, one dram, or what is sufficient. Rub the quicksilver with the sulphurated oil until the globules disappear; then add, by little at a time, the melted ammoniacum, and mix them.

614

This is a very well contrived mercurial plaster. The ammoniacum in general affords a good basis for the application of the mercury. In some cases, however, it is not sufficiently adhesive. But this inconvenience, when it does occur, may be readily remedied by the addition of a small quantity of turpentine.

Plaster of Spanish flies. L.

Take of Spanish flies, one pound; wax plaster, two pounds; prepared hog's lard, half a pound. Having melted the plaster and lard, a little before they coagulate sprinkle in the flies, reduced to a very fine powder.

615

Blistering plaster, or epispastic plaster. E.

Take of hog's lard, yellow wax, white resin, cantharides, each equal weights. Beat the cantharides into a fine powder, and add them to the other ingredients, previously melted, and removed from the fire.

Both these formulæ are very well suited to answer the intention in view, that of exciting blisters; for both are of a proper consistence, and sufficient degree of tenacity, which are here the only requisites. Cantharides of good quality, duly applied to the skin, never fail of producing blisters. When, therefore, the desired effect does not take place, it is to be ascribed to the flies either being faulty at first, or having their activity afterwards destroyed by some accidental circumstance; such as too great heat in forming, in spreading the plaster, or the like. And when due attention is paid

to these particulars, the simple compositions now introduced answer the purpose better than those compound plasters with mustard seed, black pepper, vinegar, verdegris, and the like, which had formerly a place in our pharmacopœia. It is not however improbable, that the pain of blistering plasters might be considerably diminished by the addition of a portion of opium, without preventing the good effects otherwise to be derived from them.

Wax-plaster.

- 616 Take of yellow wax, prepared mutton-suet, each three pounds; yellow resin, one pound. Melt them together, and strain the mixture whilst it is fluid.

L.

Take of yellow wax, three parts; mutton-suet, white resin, two parts. Melt them together into a plaster; which supplies the place of melilot plaster. *E.*

This plaster had formerly the title of *drawing plaster*, and was chiefly employed as a dressing after blisters, to support some discharge.

It is a very well contrived plaster for that purpose. It is calculated to supply the place of melilot plaster; whose great irritation, when employed for the dressing of blisters, has been continually complained of. This was owing to the large quantity of resin it contained, which is here on that account retrenched. It would seem that, when designed only for dressing blisters, the resin ought to be entirely omitted, unless where a continuance of the pain and irritation, excited by the vesicatory, is required. Indeed plasters of any kind are not very proper for this purpose: their consistence makes them sit uneasy, and their adhesiveness renders the taking them off painful. Cerates, which are softer and less adhesive, appear much more eligible: the cerate of spermaceti will serve for general use; and for some particular purposes, the cerate of yellow resin may be applied.

Cummin-plaster. L.

- 617 Take of the seeds of cummin, seeds of caraway, bay-berries, each three ounces; Burgundy-pitch, three pounds; yellow wax, three ounces. Mix, with the melted pitch and wax, the rest of the ingredients, powdered, and make a plaster.

This plaster stands recommended as a moderately warm discutient; and is directed by some to be applied to the hypogastric region, for strengthening the viscera, and expelling flatulencies: but it is a matter of great doubt, whether it derives any virtue either from the article from which it is named, or from the caraway or bay-berries which enter its composition.

Fetid, commonly called antihysteria, plaster. E.

- 618 Take of common plaster, asafœtida, strained, each two parts; yellow wax, strained galbanum, each one part. Mix, and make them into a plaster.

This plaster is applied to the umbilical region, or over the whole abdomen, in hysterical cases; and sometimes with good effect; but probably more from its giving an additional degree of heat to the part, than from any influence derived from the fetid

gums. It has indeed been alleged, that from the application of this plaster to the abdomen, the taste of asafœtida can be distinctly perceived in the mouth; and it is not improbable, that some absorption of its active parts may take place by the lymphatic vessels of the surface; while, at the same time, the asafœtida thus applied must constantly, in some degree, act on the nerves of the nose. But, in both these ways, its influence can be inconsiderable only; and much more effect may be obtained from a very small quantity taken internally. And we are on the whole inclined to think, that the addition of the fetid gums to the common plaster is here more disagreeable than useful.

Ladanum plaster. L.

Take of ladanum, three ounces; frankincense, one ounce; cinnamon powdered, expressed oil, called oil of mace, of each half an ounce; essential oil of spearmint, one dram. To the melted frankincense add first the ladanum, softened by heat; then the oil of mace. Mix these afterwards with the cinnamon and oil of mint, and beat them together in a warm mortar into a plaster. Let it be kept in a close vessel.

This has been considered as a very elegant stomach plaster. It is contrived so as to be easily made occasionally (for these kinds of compositions, on account of their volatile ingredients, are not fit for keeping), and to be but moderately adhesive, so as not to offend the skin, and that it may without difficulty be frequently taken off and renewed; which these sorts of applications, in order to their producing any considerable effect, require to be. But after all, it probably acts more from the mere covering which it gives to the stomach, than from any of the articles abounding with essential oil which it contains.

Litharge-plaster. L.

Take of litharge, in very fine powder, five pounds; olive-oil, a gallon. Boil them with a slow fire, in about two pints of water, constantly stirring until the oil and litharge unite, and have the consistence of a plaster. But it will be proper to add more boiling water, if the water that was first added be nearly consumed before the end of the process.

Common plaster. E.

Take of litharge, one part; olive-oil, two parts; boil them, adding water, and constantly stirring the mixture till the oil and litharge be formed into a plaster.

The heat in these processes should be gentle, and the matter kept constantly stirring, otherwise it swells up, and is apt to run over the vessel. If the composition proves discoloured, the addition of a little white lead and oil will improve the colour.

These plasters, which have long been known under the name of *Diachylon*, are the common application in excoriations of the skin, slight flesh wounds, and the like. They keep the part soft, and somewhat warm, and defend it from the air, which is all that can be expected in these cases from any plaster. Some

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of our industrious medicine-makers have thought these purposes might be answered by a cheaper composition, and accordingly have added a large quantity of common whitening and hogslard: this, however, is by no means allowable, not only as it does not stick so well, but likewise as the lard is apt to grow rancid and acrimonious. The counterfeit is distinguishable by the eye.

Litharge plaster with gum. I.

621 Take of litharge-plaster, three pounds; strained galbanum, eight ounces; turpentine, ten drams; frankincense, three ounces. The galbanum and turpentine being melted with a slow fire, mix with them the powdered frankincense, and afterwards the litharge plaster melted with a very slow fire, and make a plaster.

Gum-plaster. E.

Take of common plaster, eight parts; gum-ammoniacum strained, strained galbanum, yellow wax, each one part. Make them into a plaster according to art.

Both these plasters are used as digestives and suppuratives; particularly in abscesses, after a part of the matter has been maturated and discharged, for suppurating or discharging the remaining hard part; but it is very doubtful whether they derive any advantage from the gums entering their composition.

Litharge-plaster with quicksilver. L.

622 Take of litharge-plaster, one pound; purified quicksilver, three ounces; sulphurated oil, one dram, or what is sufficient. Make the plaster in the same manner as the ammoniacum-plaster with quicksilver.

Mercurial or blue plaster. E.

Take of olive-oil, white resin, each one part; quicksilver, three parts; common plaster, six parts. Melt the oil and resin together, and when this mixture is cold, let the quicksilver be rubbed with it till the globules disappear; then add by degrees the common plaster, melted, and let the whole be accurately mixed.

These mercurial plasters are looked on as powerful resolvents and discutients, acting with much greater certainty for these intentions than any composition of vegetable substances alone; the mercury exerting itself in a considerable degree, and being sometimes introduced into the habit in such quantity as to affect the mouth. Pains in the joints and limbs from a venereal cause, nodes, tophi, and beginning indurations of the glands, are said sometimes to yield to them.

Litharge plaster with resin. L.

623 Take of litharge-plaster, three pounds; yellow resin, half a pound. Mix the powdered resin with litharge plaster, melted with a very slow fire, and make a plaster.

Sticking-plaster. E.

Take of common plaster, five parts; white resin, one

part. Melt them together, so as to make a plaster.

These plasters are used chiefly as adhesives for keeping on other dressings, &c.

Plaster of Burgundy pitch. L.

Take of Burgundy pitch, two pounds; ladanum, one pound; yellow resin, yellow wax, of each four ounces; the expressed oil, commonly called the oil of mace, one ounce. To the pitch, resin, and wax, melted together, add first the ladanum, and then the oil of mace.

This plaster was at one time much celebrated under the title of *cephalic plaster*, the name which it formerly held in our pharmacopœias. It was applied in weakness or pains of the head, to the temples, forehead, &c. and sometimes likewise to the feet. Schulze relates, that an inveterate rheumatism in the temples, which at times extended to the teeth, and occasioned intolerable pain, was completely cured in two days by a plaster of this kind (with the addition of a little opium) applied to the part, after many other remedies had been tried in vain. He adds, that a large quantity of liquid matter exuded under the plaster in drops, which were so acrid as to corrode the cuticle: but it is probable, that this was much more the effect of the Burgundy pitch than of any other part of the composition; for when applied to very tender skin, it often produces even vesication, and in most instances operates as a rubefacient or hot plaster: and as far as it has any good effect in headach, it is probable that its influence is to be explained on this ground.

Soap-plaster. L.

Take of soap, half a pound; litharge-plaster, three pounds; mix the soap with the melted litharge plaster, and boil them to the thickness of a plaster.

Saponaceous plaster. E.

Take of common plaster, four parts; gum-plaster, two parts; Castile soap, scraped, one part. To the plasters, melted together, add the soap; then boil for a little, so as to form a plaster.

These plasters have been supposed to derive a solvent power from the soap; and in the last, the addition of the gums is supposed to promote the solvent virtue of the soap: but it is a matter of great doubt, whether they derive any material advantage from either addition.

Frankincense plaster. L.

Take of frankincense, half a pound; dragon's blood, three ounces; litharge plaster, two pounds. To the melted litharge-plaster add the rest, powdered.

This plaster had formerly in the London pharmacopœia the title of *strengthening plaster*, and is a reformation of the complicated and injudicious composition described in the former pharmacopœias, under the title of *Emplastrum ad herniam*. Though far the most elegant and simple, it is as effectual for that purpose as any of the medicines of this kind. If constantly worn with a proper bandage, it will, in children, frequently do service; though, perhaps, not so much

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from any strengthening quality of the ingredients, as from its being a soft, close, and adhesive covering. It has been supposed that plasters composed of styptic medicines constringe and strengthen the part to which they are applied, but on no very just foundation; for plasters in general relax rather than astringe, the unctuous ingredients necessary in their composition counteracting and destroying the effect of the others.

Defensive or strengthening plaster. E.

- 627 Take of common plaster, twenty-four parts; white resin, six parts; yellow wax, oil olive, each three parts; colcothar of vitriol, eight parts. Grind the colcothar with the oil, and then add it to the other ingredients previously melted.

This plaster is laid round the lips of wounds and ulcers over the other dressings, for defending them from inflammation and a fluxion of humours; which, however, as Mr Sharp very justly observes, plasters, on account of their consistence, tend rather to bring on than to prevent. It is also used in weaknesses of the large muscles, as of the loins; and its effects seem to proceed from the artificial mechanical support given to the part, which may also be done by any other plaster that adheres with equal firmness.

Deadly nightshade plaster. Brun.

- 628 Take of the juice of the recent herb of belladonna, linseed oil, each nine ounces; yellow-wax, six ounces; Venice turpentine, six drams; powder of the herb of belladonna, two ounces. Let them be formed into a plaster according to art.

There can be no doubt that the belladonna, externally applied, has a very powerful influence, both on the nerves and blood vessels of the part; and thus it has very considerable effect both on the circulation and state of sensibility of the part; and when applied under the form of this plaster, especially in affections of the mammæ and scrotum, it has been said to have very powerful influence in alleviating pain, in discussing tumors, and in promoting a favourable suppuration. It has however been but little employed in this country; and we can say nothing of it from our own experience.

Corn plaster. Dan.

- 629 Take of galbanum, dissolved in vinegar, and again inspissated, one ounce; pitch, half an ounce; diachylon, or common plaster, two drams. Let them be melted together; and then mix with them verdigris powdered, sal ammoniac, each one scruple; and make them into a plaster.

Of this plaster, as well as the former, we can say nothing from our own experience. It has been celebrated for the removal of corns, and for alleviating the pain which they occasion; and it is not improbable that it may sometimes have a good effect from the corrosive articles which it contains: but in other cases, from this very circumstance, it may tend to aggravate the pain, particularly in the first instance.

Hemlock plaster. Suec.

- 630 Take of yellow wax, half a pound; oil olive, four ounces; gum-ammoniacum, half an ounce: after

they are melted together, mix with them powdered herb of hemlock, half a pound.

This corresponds very nearly with the Emplastrum de cicuta cum ammoniaco, which had formerly a place in our pharmacopœias, and was supposed to be a powerful cooler and discentient, and to be particularly serviceable against swellings of the spleen and distensions of the hypochondres. For some time past, it has been among us entirely neglected; but the high resolvent power which Dr Stork has discovered in hemlock, and which he found it to exert in this as well as in other forms, intitle it to further trials. The plaster appears very well contrived, and the additional ingredients well chosen for assisting the efficacy of the hemlock.

Corrosive plaster. Gen.

- Take of corrosive sublimate mercury, half a dram; hogs lard, half an ounce; yellow wax, two drams. Mix them according to art.

There can be no doubt that the muriated mercury here employed is a very powerful corrosive; and there may be some cases in which it is preferable to other articles of the tribe of caustics: but this would seem to be a very uneconomical mode of applying it, as but a very small portion of what enters the plaster can act; and even that portion must have its action much restrained by the unctuous matters with which it is combined.

Plaster of fenugreek, or of mucilages. Gen.

- Take of fenugreek-seed, two ounces; linseed-oil, warm, half a pound. Infuse them according to art, and strain; then take of yellow wax, two pounds and an half; gum-ammoniac, strained, six ounces; turpentine, two ounces. Melt the gum-ammoniac with the turpentine, and by degrees add the oil and wax, melted in another vessel, so as to form a plaster.

This plaster had formerly a place in our pharmacopœias, but was rejected; and although still held in esteem by some, it is probably of no great value; at least it would seem to derive but little either from the fenugreek seed, with which it is now made, or from the oil and mucilages which formerly entered its composition.

Henbane plaster. Suec.

- This is directed to be prepared in the same manner as the emplastrum e conio, or hemlock-plaster.

From the well-known sedative power of this plant, as affecting the nervous energy of the part to which it is applied, we might reasonably conclude that good effects may be obtained from it when used under the form of plaster; and accordingly it has been with advantage employed in this manner, for allaying pain, and resolving swelling, in cases of scirrhus and cancer.

Pitch-plaster. Ross.

- Take of white resin, six ounces; ship-pitch, seven ounces; yellow wax, five ounces. Melt them, and form them into a plaster.

Pitch, applied externally, has been supposed to act on two principles, by its warmth and by its adhesive quality.

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quality. In the former way it may have some effect; but it has much more influence in the latter: and particularly it has thus been found to produce a cure in cases of tinea capitis. When a pitch-plaster is applied to the affected part of the hairy scalp, and allowed to remain there for a few days, it becomes so attached to the parts, that it cannot be removed without bringing with it the bulbs of the hair in which the disease is seated: and by this means a radical cure is not unfrequently obtained, after every other remedy has been tried in vain. But the cure is a painful one, and not without danger: for in some instances, inflammations, even of an alarming nature, have been excited by the injury thus done to the parts. Hence this mode of cure is rarely had recourse to till others have been tried without effect: and when it is employed, if the disease be extensive, prudent practitioners direct its application only to a small portion at a time, the size of a crown-piece or so: and after one part is fully cured, by application to another in succession, the affection may be soon completely overcome. With this intention it is most common to employ the pitch in its pure state: but the plaster here directed, while it is no less adhesive, is more manageable and flexible.

CHAP. XXXII. *Ointments and Liniments.*

635

OINTMENTS and liniments differ from plasters little otherwise than in consistence. Any of the official plasters, diluted with so much oil as will reduce it to the thickness of stiff honey, forms an ointment: by farther increasing the oil, it becomes a liniment.

In making these preparations, the Edinburgh college direct, that fat and resinous substances are to be melted with a gentle heat; then to be constantly stirred, sprinkling in at the same time the dry ingredients, if any such are ordered, in the form of a very fine powder, till the mixture on diminishing the heat becomes stiff.

It is to be understood that the above general directions are meant to apply to each particular composition contained in the present edition of the Edinburgh pharmacopœia. It is also to be observed, that where any compositions are ordered, as bases or ingredients of others, the college always refer to those made according to their own formula.

Ointment of hog's lard. L.

636

Take of prepared hog's lard, two pounds; rose-water, three ounces. Beat the lard with the rose-water until they be mixed; then melt the mixture with a slow fire, and set it apart that the water may subside; after which, pour off the lard from the water, constantly stirring until it be cold.

In the last edition of the London pharmacopœia, this was styled *Unguentum simplex*, the name given by the Edinburgh college to the following.

Simple ointment. E.

Take of olive oil, five parts; white wax, two parts.

Both these ointments may be used for softening the skin and healing chaps. The last is, however, preferable, on account of its being of one uniform con-

sistence. For the same reason it is also to be preferred as the basis of other more compounded ointments.

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tions and
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tions.*Ointment of verdeggris. E.*

Take of basilicon ointment, fifteen parts; verdeggris, one part.

637

This ointment is used for cleansing sores, and keeping down fungous flesh. Where ulcers continue to run from a weakness in the vessels of the part, the tonic powers of copper promise considerable advantage.

It is also frequently used with advantage in cases of ophthalmia, depending on scrofula, where the palpebræ are principally affected; but when it is to be thus applied, it is in general requisite that it should be somewhat weakened by the addition of a proportion of simple ointment or hog's lard. An ointment similar to the above, and celebrated for the cure of such instances of ophthalmia, has long been sold under the name of *Smellon's eye-salve*.

Ointment of the white calx of quicksilver. L.

Take of the white calx of quicksilver, one dram; ointment of hog's lard, one ounce and a half. Mix, and make an ointment.

638

This is a very elegant mercurial ointment, and frequently used in the cure of obstinate and cutaneous affections. It is an improvement of the ointment of precipitated mercury of the last London pharmacopœia; the precipitated sulphur being thrown out of the composition, and the quantity of mercury increased.

Ointment of calx of zinc. E.

Take of simple liniment, six parts; calx of zinc, one part.

639

This ointment is chiefly used in affections of the eye, particularly in those cases where redness arises rather from relaxation than from active inflammation.

Ointment of Spanish flies. L.

Take of Spanish flies, powdered, two ounces; distilled water, eight ounces; ointment of yellow resin eight ounces. Boil the water with the Spanish flies to one half, and strain. To the strained liquor add the ointment of yellow resin. Evaporate this mixture in a water-bath, saturated with sea-salt, to the thickness of an ointment.

640

Epispastic ointment from infusion of cantharides. E.

Take of cantharides, white resin, yellow wax, each one ounce; hog's lard, Venice turpentine, each two ounces; boiling water, four ounces. Infuse the cantharides in the water, in a close vessel, for a night; then strongly press out and strain the liquor, and boil it with the lard till the water be consumed; then add the resin, wax, and turpentine, and make the whole into an ointment.

These ointments, containing the soluble parts of the cantharides, uniformly blended with the other ingredients, are more commodious, in general occasion less pain, and are no less effectual in some cases, than the compositions with the fly in substance. This, however,

does not uniformly hold; and accordingly the Edinburgh College, with propriety, still retain an ointment containing the flies in substance.

Empyreal ointment, from powder of cantharides. L.

- 641 Take of basilicon ointment, seven parts; powdered cantharides, one part.

This ointment is employed in the dressings for blisters, intended to be made *perpetual*, as they are called, or to be kept running for a considerable time, which in many chronic, and some acute cases, is of great service. Particular care should be taken, that the cantharides employed in these compositions be reduced to a very fine powder, and that the mixture be made as equal and uniform as possible. But with these precautions, there are some particular habits in which this ointment operates with even less pain than the former, while at the same time it is generally more effectual.

Wax ointment. L.

- 642 Take of white wax, four ounces; spermaceti, three ounces; olive-oil, one pint. Stir them, after being melted with a slow fire, constantly and briskly, until cold.

This ointment had formerly the title of *unguentum album* in the London pharmacopœia. It differs very little from the simple ointment of the Edinburgh pharmacopœia, and in nothing from the ointment of spermaceti of the London pharmacopœia, excepting that in this ointment the proportion of spermaceti is somewhat less. It is an useful cooling ointment for excoriations and other frettings of the skin.

Ointment of acetated ceruse. L.

- 643 Take of acetated ceruse, two drams; white wax, two ounces; olive-oil, half a pint. Rub the acetated ceruse, previously powdered, with some part of the olive-oil; then add it to the wax, melted with the remaining oil. Stir the mixture until it be cold.

Saturnine ointment. E.

Take of simple ointment, twenty parts; sugar of lead, one part.

Both these ointments are useful coolers and desiccatives; much superior both in elegance and efficacy to the *nutritum* or *tripharicum*, at one time very much celebrated.

Ointment of ceruse, commonly called white ointment. E.

- 644 Take of simple ointment, five parts; ceruse, one part.

This is an useful, cooling, emollient ointment, of great service in excoriations and other similar frettings of the skin. The ceruse has been objected to by some, on a suspicion that it might produce some ill effects, when applied, as these unguents frequently are, to the tender bodies of children. Though there does not seem to be much danger in this external use of ceruse, the addition of it is the less necessary here, as we have another ointment containing a more active preparation of the same metal, the saturnine ointment just mentioned; which may be occasionally mixed with this, or employed by itself, in cases where saturnine applications are wanted.

Ointment of elemi. L.

Take of elemi, one pound; turpentine, ten ounces; mutton suet, prepared, two pounds; olive-oil, two ounces. Melt the elemi with the suet; and having removed it from the fire, mix it immediately with the turpentine and oil, after which strain the mixture.

This ointment, perhaps best known by the name of *linimentum arcei*, has long been in use for digesting, cleansing, and incarnating; and for these purposes is preferred by some to all the other compositions of this kind.

These, however, are much more processes of nature than of art; and it is much to be doubted whether it has in reality any influence.

Ointment of white hellebore. L.

Take of the root of white hellebore, powdered, one ounce; ointment of hog's lard, four ounces; essence of lemons, half a scruple. Mix them, and make an ointment.

White hellebore externally applied has long been celebrated in the cure of cutaneous affections; and this is perhaps one of the best formulæ under which it can be applied, the hog's lard ointment serving as an excellent basis for it, while the essence of lemons communicates to it a very agreeable smell.

Stronger ointment of quicksilver. L.

Take of purified quicksilver, two pounds; hog's lard, prepared, twenty-three ounces; mutton-suet, prepared, one ounce. First rub the quicksilver with the suet and a little of the hog's lard, until the globules disappear; then add what remains of the lard, and make an ointment.

Weaker ointment of quicksilver. L.

Take of the stronger ointment of quicksilver, one part; hog's lard, prepared, two parts. Mix them.

Quicksilver, or blue ointment. E.

Take of quicksilver, mutton-suet, each one part; hog's lard, three parts. Rub them carefully in a mortar till the globules entirely disappear.

This ointment may also be made with double or triple the quantity of quicksilver.

These ointments are principally employed, not with a view to their topical action, but with the intention of introducing mercury in an active state into the circulating system. And this may be effected by gentle friction on the sound skin of any part, particularly on the inside of the thighs or legs. For this purpose, these simple ointments are much better suited than the more compounded ones with turpentine and the like, formerly employed. For by any acrid substance topical inflammation is apt to be excited, preventing farther friction, and giving much uneasiness. To avoid this, it is necessary, even with the mildest and weakest ointment, somewhat to change the place at which the friction is performed. But by these ointments properly managed, mercury may in most instances be as advantageously introduced, either for eradicating syphilis,

is, or combating other obstinate diseases, as under any form whatever. But to obtain these effects, it is requisite that the ointment should be prepared with very great care: for upon the degree of triture which has been employed, the activity of the mercury must entirely depend. The addition of the mutton-suet, now adopted by both colleges, is an advantage to the ointment, as it prevents it from running into the state of oil, which the hog's lard alone in warm weather, or in a warm chamber, is sometimes apt to do, and which is followed by a separation of parts. We are even inclined to think, that the proportion of suet directed by the London college is too small for this purpose, and indeed seems to be principally intended for the more effectual triture of the mercury: But it is much more to be regretted, that, in a medicine of such activity, the two colleges should not have directed the same proportion of mercury to the fatty matter. For although both have directed ointments of different strength, neither the weakest nor the strongest agree in the proportion of mercury which they contain.

Ointment of nitrated quicksilver. L.

648 Take of purified quicksilver, one ounce; nitrous acid, two ounces; hog's lard, prepared, one pound. Dissolve the quicksilver in the nitrous acid; and, while it is yet hot, mix it with the hog's lard, previously melted, and just growing cold.

Yellow ointment. E.

Take of quicksilver, one ounce; spi. of nitre, two ounces; hog's lard, one pound. Dissolve the quicksilver in the spirit of nitre, by digestion in a sand-heat; and, while the solution is very hot, mix with it the lard, previously melted by itself, and just beginning to grow stiff. Stir them briskly together, in a marble mortar, so as to form the whole into an ointment.

These ointments differ only in name; and that employed by the London college is certainly the preferable appellation: For here the quicksilver, previous to its union with the lard, is brought to a saline state by means of the nitrous acid. And although its activity be very considerably moderated by the animal fat with which it is afterwards united, yet it still affords us a very active ointment; and as such it is frequently employed with success in cutaneous and other topical affections. In this condition, however, the mercury does not so readily enter the system as in the preceding form. Hence it may even be employed in some cases with more freedom; but in other instances it is apt to excoriate and inflame the parts. On this account a reduction of its strength is sometimes requisite; and it is often also necessary, from the hard consistence which it acquires, in consequence of the action of acid on the lard.

Tar ointment.

649 Take of tar, mutton suet prepared, each half a pound. Melt them together, and strain. L.

Take of tar, five parts; yellow wax, two parts. E.

These compositions, though the one be formed into an ointment by means of suet, the other by wax, can-

not be considered as differing essentially from each other. As far as they have any peculiar activity, this entirely depends on the tar. And this article, from the empyreumatic oil and saline matters which it contains, is undoubtedly, as well as turpentine, of some activity. Accordingly, it has been successfully employed against some cutaneous affections, particularly those of domestic animals. At one time, as well as the black basilicon, it was a good deal employed as a dressing even for recent wounds. But although it still retains a place in our pharmacopœias, it is at present little used with any intention.

Ointment of yellow resin. L.

Take of yellow resin, yellow wax, each one pound; olive oil, one pint. Melt the resin and wax with a slow fire; then add the oil, and strain the mixture while hot.

650

Basilicon ointment. E.

Take of hog's lard, eight parts; white resin, five parts; yellow wax, two parts.

These are commonly employed in dressings, for digesting, cleansing, and incarnating wounds and ulcers. They differ very little, if at all, in their effects, from the *linimentum aræi*, or ointment of elemi, as it is now more properly styled. But it is probable that no great effect is to be attributed to either: For there can be no doubt that the suppurative and adhesive inflammation are processes of nature, which will occur without the aid of any ointment.

Elder ointment. L.

Take of elder flowers, four pounds; mutton-suet, prepared, three pounds; olive-oil, one pint. Boil the flowers in the suet and oil, first melted together, till they be almost crisp; then strain with expression.

651

This ointment does not seem superior to some others, which are much neater, and less expensive. It can scarcely be supposed to receive any considerable virtue from the ingredient from which it takes its name. And accordingly it is not without propriety that it is rejected from the pharmacopœia of the Edinburgh college.

Ointment of spermaceti. L.

Take of spermaceti, six drams; white wax, two drams; olive-oil, three ounces. Melt them together over a slow fire, stirring them constantly and briskly until they be cold.

652

This had formerly the name of *white liniment*, and it is perhaps only in consistence that it can be considered as differing from the simple ointment already mentioned, or the simple cerate afterwards to be noticed.

Sulphur ointment. L.

Take of ointment of hog's lard, half a pound; flowers of sulphur, four ounces. Mix them, and make an ointment.

653

Ointment of sulphur, or antipruric ointment. E.

Take of hog's lard, four parts; sulphur, beat into a very

very fine powder, one part. To each pound of this ointment add essence of lemons, or oil of lavender, half a dram.

Sulphur is a certain remedy for the itch, and safer than mercury. Sir John Pringle observes, that unless a mercurial unction was to touch every part of the skin, there can be no certainty of success: whereas, from a sulphureous one, a cure may be obtained by only partial unction; the animalcula, which are supposed to occasion this disorder, being, like other insects, killed by the sulphureous steams which exhale by the heat of the body. As to the internal use of mercury, which some have accounted a specific, there are several instances of men undergoing a complete salivation for the cure of the lues venerea, without being freed from the itch: but there are also a multitude of instances of men undergoing a long course of sulphur without effect, and who were afterwards readily cured by mercury.

The quantity of ointment, above directed, serves for four unctions: the patient is to be rubbed every night; but to prevent any disorder that might arise from stopping too many pores at once, a fourth part of the body is to be rubbed at one time. Though the itch may thus be cured by one pot of ointment, it will be proper to renew the application, and to touch the parts most affected for a few nights longer, till a second quantity also be exhausted; and in the worst cases, to subjoin the internal use of sulphur, not with a view to purify the blood, but to diffuse the steams more certainly through the skin; there being reason to believe, that the animalcula may sometimes lie too deep to be thoroughly destroyed by external applications.

Tutty ointment.

654 Take of prepared tutty, one dram; ointment of spermaceti, what is sufficient. Mix them so as to make a soft ointment. L.

Take of simple liniment, five parts; prepared tutty, one part. E.

These ointments have long been celebrated, and are still much employed against affections of the eyes. But they cannot, we imagine, be esteemed elegant.

Both calamine and tutty act only by means of the zinc they contain, and calamine appears to contain the most of the two, and likewise to be the least variable in its contents. But the pure flowers prepared from zinc itself are doubtless preferable to either. Hence the ointment of tutty may be considered as inferior to both the ointment of calamine and to the ointment of the calx of zinc, which have also a place in our pharmacopœia.

Simple liniment. E.

655 Take of olive oil, four parts; white wax, one part.

This consists of the same articles which form the simple ointment of the Edinburgh pharmacopœia, but merely in a different proportion, so as to give a thinner consistence; and where a thin consistence is requisite, this may be considered as a very elegant and useful application.

Liniment of ammonia. L.

656 Take of water of ammonia, half an ounce; olive-oil,

one ounce and an half. Shake them together in a phial till they are mixed.

This has long been known in the shops under the title of *volatile liniment*, but is now more properly denominated from the principal active article, which enters its composition. It has been much employed in practice, particularly on the recommendation of Sir John Pringle in his *Observations on the Diseases of the Army*. He observes, that, in the inflammatory quinsey, or strangulation of the fauces, a piece of flannel, moistened with this mixture, applied to the throat, and renewed every four or five hours, is one of the most efficacious remedies. By means of this warm stimulating application, the neck, and sometimes the whole body, is put into a sweat, which after bleeding either carries off or lessens the inflammation. Where the skin cannot bear the acrimony of this mixture, a larger proportion of oil may be used.

Stronger liniment of ammonia. L.

Take of water of pure ammonia, one ounce; olive-oil, two ounces. Shake them together in a phial. 657

This article differs from the foregoing in strength only. This arises both from its being formed of a more acrid spirit, and from its containing that spirit in a larger proportion to the oil. It is used to supply the place of the *epithema et emplastrum volatile* of our former pharmacopœias, and is a very acrid stimulating composition. When largely applied, it often excites inflammation, and even vesication, on tender skin. It is often, however, successfully employed against obstinate rheumatic and ischiadic pains.

Camphor liniment. L.

Take of camphor, two ounces; water of ammonia, six ounces; simple spirit of lavender, sixteen ounces. Mix the water of ammonia with the spirit, and distil from a glass retort, with a slow fire, sixteen ounces. Then dissolve the camphor in the distilled liquor. 658

This formula, which has now for the first time a place in the London pharmacopœia, approaches to the volatile essence of that celebrated empyric the late Dr Ward: But the above is a more elegant and active formula than either of the receipts published by Mr Page, from Dr Ward's book of receipts; and there is no reason to doubt that it will be equally effectual in removing some local pains, such as particular kinds of headach, in consequence of external application.

Soap-liniment. L.

Take of soap, three ounces; camphor, one ounce; spirit of rosemary, one pint. Digest the soap in the spirit of rosemary until it be dissolved, and add to it the camphor. 659

This is the soap-liniment of the former edition of the London pharmacopœia, without any alteration; and it differs very little from the soap-balsam of the Edinburgh college already mentioned. Though a less active and penetrating application than the preceding, it is perhaps no less useful: and it is often successfully employed for external purposes against rheumatic pains, sprains, bruises, and similar complaints.

Egyptian ointment. Gen.

Take of honey, one pound; strong vinegar, half a pound; verdegris, powdered, five ounces. Let the ingredients be boiled together till the verdegris be dissolved, so that the ointment may have a due degree of the kness and a purple colour.

This preparation had formerly a place in our pharmacopœias under the title of *Egyptian honey*; and a similar preparation has now a place under the title of *oxymel of verdegris*. But in that formula the proportion is much less than in the above. It may justly be considered as a very powerful application for cleaning and detarging foul ulcers, as well as for keeping down fungous flesh. But these purposes may in general be answered by articles less acrid, and exciting less pain. Besides this, the above preparation is also liable to considerable uncertainty with respect to strength; for a large proportion of the verdegris will in a short time subside to the bottom; thus, what is in the top of the pot is much less active than that in the bottom.

Anodyne ointment. Gen.

Take of olive-oil, ten drams; yellow wax, half an ounce; crude opium, one dram. Mix them according to art, so as to form an ointment.

Opium thus externally applied, will in some degree be productive of the same effect as when used under the form of the anodyne balsam. In that state it produces its effects more immediately; but under the present form its effects are more permanent. Besides this, the present ointment furnishes us with an useful dressing for sores attended with severe pain; to which opium when dissolved in spirit cannot be applied. Hence the present, or some analogous formula, is well intitled to a place in our pharmacopœias.

Ointment for an ulcerated cancer. Brun.

Take of the recently expressed juice of the ricinus, one pound: let it be exposed to the rays of the sun in a leaden vessel till it acquire the consistence of an oil; then to one pound of this inspissated juice add calcined lead, white precipitate mercury, each one pound. Let them be properly mixed.

This acrid application must possess a considerable degree of corrosive power. And in some cases of cancer, by the proper application of corrosives, much benefit may be done: But where the disease has made any considerable progress, these will in general have the effect rather of hastening its progress than of removing it; particularly if there be a large indolent tumor below the ulcer.

Digressive ointment. Ross.

Take of Venice turpentine, one pound; the yolks of eight eggs. Mix them together according to art.

This warm stimulating application is well suited to promote the suppurative inflammation, and may be advantageously had recourse to, where it is necessary to encourage a large discharge of pus.

Hæmorrhoidal ointment.

Take saturnine ointment, six drams; oil of hyoscy-

mus, obtained by boiling, two drams; camphor, powdered, two scruples; saffron, one scruple. Mix them into an ointment.

The name affixed to this ointment expresses the purpose for which it is applied. From the articles of which it consists, it may be concluded, that it possesses a gently emollient and anodyne power; and may therefore afford considerable relief, where much pain arises from external hæmorrhoidal tumors.

Laurel ointment. Suec.

Take of prepared mutton-suet, eight ounces. After it is melted and removed from the fire, add to it oil of bays, one pound; ethereal oil of turpentine, one ounce; rectified oil of amber, half an ounce. Let them be mixed and rubbed together till they form an ointment.

This is an improved mode of forming an ointment which had formerly a place in our pharmacopœias under the title of *nervine ointment*. And it furnishes a warm stimulating nervine application, which may in some degree restore sense and motion to paralytic limbs. And while it at least serves to lead to the careful use of friction, it may somewhat increase the benefit which would result from it.

Ointment of tobacco. Dan.

Take of the leaves of tobacco, three pounds; juice of tobacco, nine ounces; hog's lard, a pound and a half; resin, three ounces. Let the cut leaves be macerated for the space of a night, and then boiled over a gentle fire. Having strained the fluid obtained by expression, add to it yellow wax, half an ounce; powder of the root of birthwort, three ounces. Mix them into an ointment.

There can be no doubt that tobacco externally applied has very powerful effects on the human body; and that not merely from its topical action, but sometimes even as affecting the system in general. From this last circumstance it requires to be used with great caution. It has, however, been found, under proper management, to afford an effectual cure in obstinate cutaneous affections. But were it to be used with this intention, we would have a more elegant formula, by merely impregnating either hog's lard, or the simple ointment, with the active qualities extracted by the aid of heat from the leaves of the prepared tobacco in the state in which it is usually brought to us from America, than by having recourse to the recent juice, and to the aristolochia and other additions here directed.

Ointment of storax. Suec.

Take of olive oil, a pound and a half; white resin, gum elemi, yellow wax, each seven ounces. After they are melted together and strained, add liquid storax, seven ounces. Mix them together, and agitate the mixture till it concretes into an uniform ointment.

An ointment supposed to derive its activity from the storax, although it have no place in our pharmacopœias, is received into most of the foreign ones. And it has been much celebrated not only as a strengthening application to weakly children, but even for the removal of affections of the bones, as in cases of rachi-

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tion and the like. It is, however, very doubtful how far these properties depend on the storax. If it have really any good effect, it is probable that this is more the consequence of the friction merely, than of any of the articles which enter the composition of the ointment. But there is reason to believe that the virtues attributed to this ointment are more imaginary than real.

Onion ointment. Succ.

- 668 Take of yellow wax, resin, each half a pound. To these melted, add onions roasted under the ashes, honey, each two pounds and a half; black soap, half a pound. Let them be gently boiled together till all the moisture be consumed, then strain the liquor, expressing it from the materials, and afterwards agitate it with a wooden pottle that it may unite into one uniform mass.

This ointment is applied with the intention of promoting suppuration. And it has long been supposed, that the onion, especially in its roasted state, has a remarkable influence in this way: but there is reason to think, that the powers attributed to it have been greatly over-rated. And there is even ground to presume that these effects totally depend entirely on heat and moisture. Hence no application is perhaps better suited for promoting suppuration than a poultice of bread and milk, applied as hot as can be borne with and frequently repeated.

CHAP. XXXIII. *Cerates.*

- 669 CERATES are substances intended for external application, formed of nearly the same materials which constitute ointments and plasters. And they differ principally from these in being merely of an intermediate consistence between the two. Accordingly, they are seldom the subject of a separate chapter by themselves, but are classed either with the one or the other. In the Edinburgh pharmacopœia they are classed among the ointments: but as the London college have referred them to a separate head, we shall here also consider them by themselves.

Simple cerate. E.

- 670 Take of olive oil, six parts; white wax, three parts; spermaceti, one part. Unite them according to art. This differs from the simple ointment in containing a greater proportion of wax to the oil, and in the addition of the spermaceti. But by these means it obtains only a more firm consistence, without any essential change of properties.

Cerate of cantharides, or Spanish flies. L.

- 671 Take of cerate of spermaceti, softened with heat, six drams; Spanish flies, finely powdered, one dram. Mix them.

Under this form cantharides may be made to act to any extent that is requisite. It may supply the place either of the blistering plaster or ointment; and there are cases in which it is preferable to either. It is particularly more convenient than the plaster of cantharides, where the skin to which the blister is to be applied is previously much affected, as in cases of small-

pox; and in supporting a drain under the form of issue, it is less apt to spread than the latter ointment.

Calamine-cerate. L.

- Take of calamine prepared, yellow wax, each half a pound; olive oil, one pint. Melt the wax with the oil; and, as soon as the mixture begins to thicken, mix with it the calamine, and stir the cerate until it be cold.

Cerate of calamine. E.

- Take of simple cerate, five parts; calamine prepared, one part.

These compositions are formed on the cerate which Turner strongly recommends in cutaneous ulcerations and excoriations, and which has been usually distinguished by his name. They appear from experience to be excellent epulotics, and as such are frequently used in practice.

Cerate of acetated litharge. L.

- Take of water of acetated litharge, two ounces and a half; yellow wax, four ounces; olive oil, nine ounces; camphor, half a dram. Rub the camphor with a little of the oil. Melt the wax with the remaining oil; and as soon as the mixture begins to thicken, pour in by degrees the water of acetated litharge, and stir constantly until it be cold; then mix in the camphor before rubbed with oil.

This application has been rendered famous by the recommendations of Mr Goulard. It is unquestionably in many cases very useful. It cannot, however, be considered as varying essentially from the saturnine ointment, or ointment of acetated ceruse, formerly mentioned. It is employed with nearly the same intentions, and differs from it chiefly in consistence.

Cerate of yellow resin. L.

- Take of ointment of yellow resin, half a pound; yellow wax, one ounce. Melt them together, and make a cerate.

This had formerly the name of *lemon-ointment*. It is no otherwise different from the yellow balsicum, or ointment of yellow resin, than being of a stiffer consistence, which renders it for some purposes more com-
modious.

Soap cerate. L.

- Take of soap, eight ounces; yellow wax, ten ounces; litharge, powdered, one pound; olive oil, one pint; vinegar, one gallon; boil the vinegar with the litharge over a slow fire, constantly stirring until the mixture unites and thickens; then mix in the other articles, and make a cerate.

This, notwithstanding the name, may rather be considered as another saturnine application; its activity depending very little on the soap; and it may be held as varying in little else but consistence from the plaster of litharge. It can hardly be thought to differ in its properties from the cerate of acetated litharge just mentioned; for neither the small proportion of camphor which enters the composition of the one, nor the soap which gives name to the other, can be considered as having much influence.

Cerate of spermaceti. L.

Take of spermaceti, half an ounce; white wax, two ounces; olive oil, four ounces. Melt them together, and stir until the cerate be cold.

This had formerly the name of *white cerate*, and it differs in nothing from the ointment of spermaceti, or white liniment, as it was formerly called, excepting in consistence, both the wax and the spermaceti bearing a greater proportion to the oil.

Lip-salve. Ross.

677 Take of olive oil, eighteen ounces; white wax, one pound; spermaceti, an ounce and a half; oil of rhodium, half a dram. Form a cerate, tinging it with alkanet, so as to give a red colour.

The name affixed to this cerate points out the use for which it is intended. It is chiefly employed against those chaps and excoriations of the lips, which are often the consequence of cold weather; and it is very well suited for removing affections of that kind. But excepting in the colour and smell which it derives from the alkanet and rhodium, it differs in nothing from the cerate of spermaceti, and cannot be considered as more effectually answering the intention in view.

Bougies. Suec.

678 Take of yellow wax, melted, one pound; spermaceti, three drams; vinegar of litharge, two drams. Mix them, and upon removal from the fire immerse into the mixture slips of linen, of which bougies are to be formed according to the rules of art. These may also be made with double, triple, or quadruple, the quantity of the vinegar.

It is perhaps rather surprising, that no formula for the preparation of bougies has a place in our pharmacopœias: for there can be no doubt, that although the preparation of them has hitherto been principally trusted to empirics; yet in the hand of the skilful practitioner they are of great service in combating obstinate affections. Although it has been pretended by some that their influence is to be ascribed to certain impregnations; yet it is on better grounds contended, that they act entirely on mechanical principles. The great object is therefore to obtain the union of a proper degree of firmness and flexibility. These qualities the above composition possesses; and it does not probably derive any material benefit from being prepared with an additional proportion of the vinegar of litharge.

CHAP. XXXIV. *Epithems.*

679 By epithems or cataplasms are in general understood those external applications which are brought to a due consistence or form for being properly applied, not by means of oily or fatty matters, but by water or watery fluids. Of these not a few are had recourse to in actual practice; but they are seldom prepared in the shops of the apothecaries; and in some of the best modern pharmacopœias no formulæ of this kind are introduced. The London college, however, although they have abridged the number of epithems, still retain a few. And it is not without some advantage that there are fixed forms for the preparation of them.

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Cataplasin of cummin. L.

Take of cummin-seed, one pound; bay berries, dry leaves of water-germander, or scordium, Virginian snake root, of each three ounces; cloves, one ounce. Rub them all together; and, with the addition of three times the weight of honey, make a cataplasin.

This is adopted into the present edition of the London pharmacopœia with very little alteration from the last. It was then intended as a reformation of the *theriaca Londinensis*, which for some time past has been scarcely otherwise used than as a warm cataplasin. In place of the numerous articles which formerly entered that composition, only such of its ingredients are retained as contribute most to this intention: but even the article from which it now derives its name, as well as several others which still enter it, probably contribute very little to any medical properties it may possess.

Mustard-cataplasin. L.

Take of mustard seed, powdered, crumb of bread, each half a pound; vinegar, as much as is sufficient.

Mix, and make a cataplasin.

Epithems of this kind are commonly known by the name of *sinapisms*. They were formerly not unfrequently prepared in a more complicated state, containing garlic, black-soap, and other similar articles; but the above simple form will answer every purpose which they are capable of accomplishing. They are employed only as stimulants: they often inflame the part and raise blisters, but not so perfectly as cantharides. They are frequently applied to the soles of the feet in the low state of acute diseases, for raising the pulse and relieving the head. The chief advantage they have depends on the suddenness of their action.

Alum-curd. L.

Take the whites of two eggs; shake them with a piece of alum till they be coagulated.

This preparation is taken from Riverius. It is an useful astringent epithem for sore, moist eyes, and excellently cools and represses thin defluxions. Slighter inflammations of the eyes, occasioned by dust, exposure to the sun, or other similar causes, are generally removed by fomenting them with warm milk and water, and washing them with solutions of white vitriol. Where the complaint is more violent, this preparation, after the inflammation has yielded a little to bleeding, is one of the best external remedies. It is to be spread on lint, and applied at bed-time.

A TABLE, showing in what Proportions MERCURY or OPIUM enter different Formulæ.

Pulvis e creta compositus cum opio. L. In about forty-four grains, one grain of opium is contained.

Pulvis ipecacuanhe compositus. L. In ten grains, one grain of opium.

Pulvis sudorificus. E. In eleven grains, one grain of opium.

Pulvis opiatu. L. In ten grains, one grain of opium.

Pulvis e scammonio cum calomelane. L. In four grains, one grain of calomel.

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Tinctura ex opio. L. In five grains, one grain of opium.
Tinctura thebaica. E. In ten grains, one grain of opium.
Tinctura ex hydragyro. L. In two grains and a half, one grain of mercury.
Tinctura ex hydragyro. E. In four grains, one grain of mercury.
Tinctura plumerii. E. In two grains and two-thirds, one grain of calomel.
Tinctura opiana. L. In thirty-six grains, one grain of opium.
Tinctura Japonicum. E. In about one hundred and twenty-three grains, one grain of opium.
Tinctura Thalaicum. E. In ninety-seven grains, one grain of opium.
Trochisci bellini cum opio. E. In fifty five grains, one grain of opium.
These trochisci are not unfrequently ordered *cum duplici opio*, and under this form are kept in many shops.
Euphyasium ammoniacum cum hydragyro. L. In five ounces, one ounce of mercury.
Euphyasium lythargyri cum hydragyro. L. In five ounces, one ounce of mercury.
Euphyasium hydragyro. E. In three ounces and two-thirds, one ounce of mercury.
Unguentum hydragyri fortius. L. In two drams, one dram of mercury.

Unguentum hydragyri mitius. L. In five drams, one dram of mercury.
Unguentum ex hydragyro. E. In five drams, one dram of mercury.
Unguentum hydragyri nitrati. L. In one dram, four grains of nitrated quicksilver.
Unguentum citrinum. E. In one dram, four grains of nitrated quicksilver.
Unguentum calcis hydragyri alba. L. In one dram, four grains and two-thirds of the calx hydragyri alba.
Tinctura opii (L.) is made with opium, in the proportion of one grain to about thirteen of the menstruum.
Tinctura Thebaica (E.) is made with opium, in the proportion of one grain to twelve of the menstruum.
Tinctura opii camphorata (L.) is made with opium, in the proportion of one grain to two hundred and sixty of the menstruum.
Elixir paregoricum (E.) is made with opium, in the proportion of one grain to sixty-eight of the menstruum.
Balsamum anodynum (E.) is made with opium, in the proportion of one grain to about thirty of the menstruum.

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P H A

P H A

Pharos.

PHAROS, (Homer, Strabo, &c.), a small oblong island, adjoining to the continent of Egypt, over-against Alexandria. On this island stood a conominal light-tower, of four sides, each side a stadium in length; and the tower so high as to be seen 100 miles off. Some affirm, each of its four corners rested on a large sea-crab of glass or of hard transparent stone of Ethiopia or Memphis. Others imagine the crabs were only added externally to the base by way of ornament, or as emblematical of its situation and use. The architect was Sostrates the Cnidian, as appears by an inscription on the tower, under Ptolemy Philadelphus, who laid out 800 talents upon it. On account of the port of Alexandria, the entrance to which was difficult and dangerous, the Pharos was called *the key of the Egyptian sea*, or even of Egypt itself (Lucan): and Pharos, from being a proper name, is become an appellative to denote all light-houses.

PHAROS, or *Phare*, a light-house; a pile raised near a port, where fire is kept burning in the night, to guide and direct vessels near at hand. The pharos of Alexandria, built in the island of Pharos, at the mouth of the Nile, was anciently very famous, inasmuch as to communicate its name to all the rest. This most magnificent tower consisted of several stories and galleries, with a lantern at top, in which a light being continually burning, might be seen for many leagues at sea, and along the coast. It was accounted one of the seven wonders of the world. It was built by the famed architect Sostrates, a native of Cnidos, or, according to some, by Deiphanes, the father of Sostrates; and cost Ptolemy Philadelphus 800 talents. The several stories were adorned with columns, ballustrades, galleries of the finest marble and workmanship; to which some add, that the architect had contrived to fasten some looking-glasses so artificially against the highest galleries,

Pharos

Pharpar, Pharfalia galleries, that one could see in them all the ships that sailed on the sea for a great way. Instead of which noble structure, one sees now only a kind of irregular castle, without ditches or outworks of any strength, the whole being accommodated to the inequality of the ground on which it stands, and which it seems is no higher than that which it should command. Out of the midst of this clumsy building rises a tower, which serves for a light-house, but which hath nothing of the beauty and grandeur of the old one. The Colossus of Rhodes also served as a pharos.

PHARPAP, or PHARPAPAR, is one of the rivers of Damascus, or rather it is an arm of the Barrady or Charysiorrhos, which waters the city of Damascus and the country about it (2 Kings v. 12.) "Are not Abana and Pharpar, rivers of Damascus, better than all the waters of Israel?" The river of Damascus has its fountain in the mountains of Libanus. At its approach to the city it is divided into three arms, one of which passes through Damascus. The other two water the gardens round about, and then reuniting, they lose themselves at four or five leagues from the city, towards the north. See *Maurand's Travels from Aleppo to Jerusalem*; see also the articles **ASANA** and **DAMASCUS**.

PHARSALIA, PHARSALIUM, Pharsalus, or Pharfalos, (anc. geog.), a town of the Phthiotis, a district of Thessaly, near Phere and Larissa, to which last place Pompey fled from the plains of Pharfalus; watered by the river Enipeus, which falls into the Apidanus, and both together into the Peneus. Between Pharfalus and Enipeus, Pompey drew up his men at the fatal battle of Pharfalia.

In this battle, the advantage with respect to numbers was greatly on the side of Pompey. That general himself was on the left with the two legions which Cæsar had returned to him at the beginning of the war. Scipio, Pompey's father-in-law, was in the centre, with the legions he had brought from Syria, and the reinforcements sent by several kings and states of Asia. The Cilician legion, and some cohorts which had served in Spain, were in the right, under the command of Afranius. As Pompey's right wing was covered by the Enipeus, he strengthened the left with his slingers, archers, and the good Roman horse, on whom chiefly his party founded their hopes of victory. The whole army was drawn up in three lines, with very little space between them. In conformity to this disposition, Cæsar's army was drawn up in the following order: The tenth legion, which had on all occasions signally distinguished above all the rest, was placed in the right wing, and the ninth in the left; but as the latter had been considerably weakened in the action at Dyrrhachium, the eighth legion was posted so near it as to be able to support and reinforce it upon occasion. The rest of Cæsar's forces filled up the space between the two wings. Marc Antony commanded the left wing, Sylla the right, and Cneius Domitius Calpurnius the main body. As for Cæsar, he posted himself in the right over-against Pompey, that he might have him always in his sight.

Thus was the whole plain covered, from Pharfalia to the Enipeus, with two armies, dressed and armed after the same manner, and bearing the same ensigns, the Roman eagles. Pompey observing how well the

enemy kept their ranks, expecting quietly the sign of battle, and on the contrary how impatient and restless his own men were, running up and down in great disorder for want of experience, he began to be afraid lest his ranks should be broken upon the first onset; and therefore commanded the foot in the front to keep their ground, and quietly wait for the enemy. The two armies, then in view of each other, kept a mournful silence; but at length the trumpets sounded the charge, and Cæsar's army advanced in good order to begin the attack, being encouraged by the example of one Caius Crastinus, a centurion, who at the head of 120 men threw himself upon the enemy's first line with incredible fury. That he did to acquit himself of a promise he had solemnly made to Cæsar, who, meeting him as he was going out of his tent in the morning, asked him, after some discourse, *What his opinion was touching the event of the battle?* To which he, stretching out his hand, replied aloud, *Time is the victory, Cæsar; thou shalt gloriously appear, and I myself this day will be the subject of thy prayer either dead or alive.* In pursuance of this promise he broke out of his rank as soon as the trumpet sounded; and, at the head of his company, ran in upon the enemy, and made a great slaughter of them. But while he was still pressing forward, forcing his way through the first line, one of Pompey's men ran him in at the mouth with such violence, that the point of his sword came out at the hind part of his neck. Upon his death Pompey's soldiers took courage, and with great bravery stood the enemy's onset. While the foot were thus sharply engaged in the centre, Pompey's horse in the left wing marched up confidently; and having first widened their ranks, with a design to surround Cæsar's right wing, charged his cavalry, and forced them to give ground. Hereupon Cæsar ordered his horse to retreat a little, and give way to the six cohorts, which he had posted in the rear as a body of reserve. These, upon a signal given, coming up, charged the enemy's horse with that resolution and good order which is peculiar to men who have spent all their lives in camps. They remembered their instructions, not striking at the legs or thighs of the enemy, but aiming only at their faces. This unexpected and new manner of fighting had the desired effect. For the young patricians, whom Cæsar contemptuously calls the *pretty young dancers*, not being able to bear the thoughts of having their faces deformed with scars, turned their backs, and, covering their faces with their hands, fled in the utmost confusion, leaving the foot at the mercy of the enemy. Cæsar's men did not pursue the fugitives; but charging the foot of that wing, now naked and unguarded, surrounded them, and cut most of them in pieces.

Pompey was so transported with rage, in seeing the flower of his forces thus put to flight or cut in pieces, that he left his army, and retired slowly towards his camp, looking more like a man distracted and beside himself than one who by his exploits had acquired the name of *the Great*. When he had reached the camp, he retired to his tent without speaking a word to any; and continued there, like one distracted and out of his senses, till his whole army was defeated. Cæsar no sooner saw himself master of the field than

Pharsalia.

he marched to attack the enemy's entrenchments, that Pompey might not have time to recollect himself. When Pompey was informed that his rival was advancing to attack his entrenchments, he then first seemed to have recovered his senses, and cried out, *What, into my camp too!* He said no more; but immediately laying aside the marks of his dignity, and putting on such a garment as might best favour his flight, he stole out at the decuman gate, and took the road to Larissa, which city had hitherto shown great attachment to him. In the mean time Cæsar began the attack on the enemy's camp, which was vigorously defended by the cohorts Pompey had left to guard it; but they were at length forced to yield. Cæsar was not a little surprised, when, after having forced the entrenchments, he found the enemy's tents and pavilions richly adorned with carpets and hangings, their couches strewed with flowers, their tables ready spread, and sideboards set out with abundance of plate, bowls, and glasses, and some of them even filled with wine. So great was the confidence of Pompey's party, that they made preparations before-hand for pleasures to be enjoyed after the victory, which they thought certain. In Pompey's tent, Cæsar found the box in which he kept his letters: but, with a moderation and magnanimity worthy of himself, he burnt them all, without reading one; saying, that he had rather be ignorant of crimes, than obliged to punish them.

The next day, when the dead were numbered, it appeared that Cæsar had scarce lost 200 men; among whom was about 30 centurions, whom Cæsar caused to be buried with great solemnity. He did particular honours to the body of Crassinus, who had begun the battle; and ordered his ashes to be deposited in a tomb, which he erected to his memory. On Pompey's side, the number of the dead amounted to 15,000 according to some, and to 25,000 according to others. Cæsar took 24,000 prisoners, eight eagles, and 180 ensigns.

PHARSALIA, an epic poem, composed by Lucan on the civil war between Pompey and Cæsar, and particularly on the victory of the latter over the former, of which we have given an account in the preceding article. It is a poem universally acknowledged to have great beauties and great defects; but we are the less capable of estimating its merit as a whole, that either time has deprived us of the last books, or its author has left it incomplete. "The subject of the Pharsalia (says an excellent critic) carries undoubtedly all the epic grandeur and dignity: neither does it want unity of object, viz. the triumph of Cæsar over the Roman liberty. In the choice of that subject, he thinks, however, that the author was not happy. The civil wars were too recent to admit in the description of them the embellishments of fiction and machinery. The fables of the gods mixed with the exploits of Cæsar and Pompey, instead of raising, would have diminished the dignity of such well known facts." Another objection to the subject, perhaps more forcible than this, arises from the success of the war and the abilities of the generals. Lucan was a friend to liberty, and wished to raise the character of Pompey and Cato; but in spite of his utmost efforts, they are always eclipsed by the superior talents and consequent success of Cæsar. All his characters, however, are drawn

with spirit, and with uncommon regard to truth; and some of the speeches which he puts into the mouths of his heroes are equal for moral sublimity to any thing that is to be found in all antiquity.

"There are in the Pharsalia (continues the critic already quoted) several very poetical and spirited descriptions. But the author's chief strength does not lie either in narration or description. His narration is often dry and barren; his descriptions are often overwrought, and employed too upon disagreeable objects. His principal merit consists in his sentiments, which are generally noble and striking, and expressed in that glowing and ardent manner which peculiarly distinguishes him. Lucan is the most philosophical and the most public-spirited poet of all antiquity. He was the nephew of the famous Seneca the philosopher; was himself a Stoic; and the spirit of that philosophy breathes throughout his poem. We must observe, too, that he is the only ancient epic poet whom the subject of his poem really and deeply interested. Lucan recounted no fiction. He was a Roman, and had felt all the direful effects of the Roman civil war, and of that severe despotism which succeeded the loss of liberty. His high and bold spirit made him enter deeply into this subject, and kindle, on many occasions, into the most real warmth. Hence, he abounds in exclamations and apostrophes, which are almost always well timed, and supported with a vivacity and fire that do him no small honour.

"But it is the fate of this poet, that his beauties can never be mentioned, without their suggesting his blemishes also. As his principal excellency is a lively and glowing genius, which appears sometimes in his descriptions, and very often in his sentiments, his great defect in both is want of moderation. He carries every thing to an extreme. He knows not where to stop. From an effort to aggrandise his objects, he becomes tumid and unnatural: and it frequently happens, that where the second line of one of his descriptions is sublime, the third, in which he meant to rise still higher, is perfectly bombast. Lucan lived in an age when the schools of the declaimers had begun to corrupt the eloquence and taste of Rome. He was not free from the infection; and too often, instead of showing the genius of the poet, betrays the spirit of the declaimer; but he is, on the whole, an author of lively and original genius."

PHARUS, in botany: A genus of the hexandria order, belonging to the monœcia class of plants; and in the natural method ranking under the fourth order, *Gramina*. The male calyx is a bivalved uniflorous glume; the corolla, a bivalved glume; the female calyx the same with the male; the corolla an uniflorous, long, and wrapping glume. There is but one seed.

PHARYNX, in anatomy. See there, p. 708, 709.

PHASCUM, in botany: A genus of the order of musci, belonging to the cryptogamia class of plants. The anthera is operculated, with a ciliated mouth; the calyptræ are minute.

PHASEOLUS, the KIDNEY-BEAN; a genus of the decandria order, belonging to the diadelphica class of plants. There is only one species; but of this there are many varieties. Those principally cultivated for the table are, 1. The common white, or Dutch kidney-

bean.

Blair's
Lectures.

Phaseolus. bean. 2. The smaller kidney-bean, commonly called the *Battersea* kidney-bean. And, 3. The upright sort, called the *tree* kidney-bean.

1. The first sort was some time ago propagated in England, and is still in Holland; it grows very tall, and requires long stakes and poles to climb on, and its beans are considerably broad: this makes them less saleable in the markets, people supposing them to be old because they are broad; and they are hence grown into disuse, though a much more valuable kind for eating than any other.

2. The second sort, or *Battersea* bean, is what is more universally cultivated: it never grows very tall, nor rambles far, and the air can easily pass between the rows, because of its moderate growth; and this makes it bear plentifully, and ripen well for the table. It is the best tasted bean, except the last.

3. The third, or *tree* kidney-bean, is also a plentiful bearer, and never rambles, but grows up in form of a shrub; but its beans are broader than the *Battersea* kind, and are not so well tasted.

They are all propagated from seeds, which are to be put into the ground in the latter end of March or beginning of April for an early crop: but these should have a warm situation and a dry soil; they must also be planted in a dry season. The manner of planting them is, to draw lines with a bough over the bed, at two feet and a half distance, into which the seeds are to be dropped at about two inches asunder; and the earth is to be drawn over them with the head of a rake, to cover them about an inch deep. In a week after sowing, the plants will appear, and the earth should be drawn up about their stalks as they rise up; for a few days after this they will require no further care, except to be kept clear from weeds, and, when the beans appear, to have them gathered twice a-week; for if the beans are suffered to hang on too long, they not only become of no value, but they weaken the plant. The first crop of kidney-beans will continue a month in good order; and, to supply the table afterwards, there should be fresh sowings in March, April, May, and June; the last of which will continue till the frosts come to destroy them. Some raise their early crops on hot-beds; and this is to be done exactly in the same manner as the raising the early cucumbers.

A new species of *phaseolus*, apparently a very useful one, has been discovered by M. Morancy, "an inhabitant of Morne Rouge, dependant on the Cape;" we suppose Cape François of the island of St Domingo. In his search for plants, subservient to his collection of insects for the king's cabinet, he was overtaken by night, and he passed it in a cave, to which he had recourse for shelter. At its extremity he found beds of fossils, broken pieces of burnt earthen-ware, some tools and other things, which showed that this cave had formerly been the habitation of the natives. Near it he saw a climbing plant attached to some trees, with clusters of dry pods hanging from it. These he gathered, and on his return sowed the seed. Some months after, the plants grew tall and strong: they appeared to resemble a *phaseolus* known at Perpignan by the name of *carapuce*, and in the superb portfolios of the king by that of *phaseolus Indicus, cochlearis flore*, which produced many roots, not unlike the ma-

nioc. On examining the root after the pods were ripe, he found from three to eight roots of this kind. The force of the vegetation was wonderful; but dreading the deleterious effects of recent manioc, he did not taste them, but subjected them to a chemical analysis, which proved nothing. After boiling them in water a little salted, he ventured to taste them, and found them moist, unctuous, and saccharine, not unlike potatoes. He made, after some hours trial, very good cassava with them, without being incommoded by the disagreeable fibres which are met with in the manioc during this operation. Since that time, biscuit and bread have been made from these roots by M. Lombart counsellor at the Cape. The plant has been found to be very common in the woods. It requires no peculiar management: its roots are in season when the pods blacken, and its fibres run in every direction, searching for nourishment through the clefts of rocks, and receiving the impression of the itraita without injury. If the principal root is left, the plant shoots again and flourishes as before; but it is not yet ascertained whether it puts forth any new roots. The seeds are not alimentary when dressed, as if nature designed them only for propagating other plants. Every use which a farinaceous plant can supply, this new *phaseolus* has successfully answered; and the seeds in the hands of Messrs Heretier and Thouin will probably furnish a sufficient quantity for curiosity as well as use.

PHASES, in astronomy, from the Greek word *φαῖς*, "to appear;" the several appearances or quantities of illumination of the moon, Venus, Mercury, and the other planets. See ASTRONOMY.

PHASGA, or PISGAH, (Moses), a mountain on the other side Jordan, joined to Abarim and Nebo, and running south to the mouth of the Arnon: from which Moses had a view of the promised land, and where he died, having before appointed Joshua his successor. Wells takes Pisgah and Nebo to be different names of one and the same mountain, a part or branch of the mountains Abarim, (Deut. xxxii. 49. compared with Deut. xxxiv. 1.) Or that the top of Nebo was peculiarly called *Pisgah*; or some other part of it, cut out in steps, as the primitive word denotes: and thus it is rendered by Aquila, by a Greek word signifying *cut out* (Jerome). There was also a city of this name, *id.*; and the adjoining country was in like manner called *Pisgah*, *id.*

PHASIANUS, in ornithology, a genus belonging to the order of gallinæ. The cheeks are covered with a smooth naked skin.

Gibbons, in his Roman History, tells us, that the name *Phasianus* is derived from the river Phasis, the banks of which is the native habitation of the pheasant. See PHASIS.

1. The gallus, or common dunghill cock and hen, with a compressed caruncle or fleshy comb on the top of the head, and a couple of caruncles or wattles under the chin. The ears are naked, and the tail is compressed and erected. Of all other birds, perhaps this species affords the greatest number of varieties; there being scarce two to be found that exactly resemble each other in plumage and form. The tail, which makes such a beautiful figure in the generality of these birds, is yet found entirely wanting in others; and not only

Phaseolus
||
Phasianus.

Phasianus the tail, but the rump also. The toes, which are usually four in all animals of the poultry kind, yet in a species of the cock are found to amount to five. The feathers, which lie so sleek and in such beautiful order in most of those we are acquainted with, are in a peculiar breed all inverted, and stand staring the wrong way. Nay, there is a species that comes from Japan, which instead of feathers seems to be covered over with hair.

It is not well ascertained when the cock was first made domestic in Europe; but it is generally agreed that we first had him in our western world from the kingdom of Persia. Aristophanes calls the cock the *Persian bird*; and tells us he enjoyed that kingdom before some of its earliest monarchs. This animal was in fact known so early even in the most savage parts of Europe, that we are told the cock was one of the forbidden foods among the ancient Britons. Indeed, the domestic fowl seems to have tamed the wild one. Persia itself, that first introduced it to our acquaintance, seems no longer to know it in its natural form; and if we did not find it wild in some of the woods of India, as well as those of the islands in the Indian ocean, we might begin to doubt, as has been done with regard to sheep, in what form it first existed in a state of nature. But the cock is still found in the islands of Pinim, in many others of the Indian ocean, and in the woods on the coast of Malabar, in its ancient state of independence. In his wild condition, his plumage is black and yellow, and his comb and wattles yellow and purple. There is another peculiarity also in those of the Indian woods; their bones, which, when boiled, with us are white, as every body knows, in those are as black as ebony.

In their first propagation in Europe, there were distinctions then that now subsist no longer. The ancients esteemed those fowls whose plumage was reddish as invaluable; but as for the white, it was considered as utterly unfit for domestic purposes. These they regarded as subject to become a prey to rapacious birds; and Aristotle thinks them less useful than the former. Indeed, his division of those birds seems taken from their culinary uses: the one sort he calls *generous and noble*, being remarkable for fecundity; the other sort, *ignoble and useless*, from their sterility. These distinctions differ widely from our modern notions of generosity in this animal; that which we call the *game-cock* being by no means so fruitful as the ungenetous dunghill cock, which we treat with contempt. The Athenians had their cock-matches as well as we; but it is probable they did not enter into our refinement of choosing out the most barren of the species for the purposes of combat.

However this be, no animal in the world has greater courage than the cock when opposed to one of his own species; and in every part of the world where refinement and polished manners have not entirely taken place, cock fighting is a principal diversion. In China, Indi, the Philippine islands, and all over the East, cock-fighting is the sport and amusement even of kings and princes. With us it is declining every day; and it is to be hoped it will in time become only the pastime of the lowest vulgar. See the article *Cock pit*.

The cock claps his wings before he sings or crows. His sight is very piercing; and he never fails to cry in a

peculiar manner, when he discovers any bird of prey in the air. His extraordinary courage is thought to proceed from his being the most fallacious of all other birds whatsoever. A single cock suffices for ten or a dozen hens; and it is said of him that he is the only animal whose spirits are not abated by indulgence. But then he soon grows old; the radical moisture is exhausted; and in three or four years he becomes utterly unfit for the purposes of impregnation. "Hens also (to use the words of Willoughby), as they for the greatest part of the year daily lay eggs, cannot suffice for so many births, but for the most part after three years become effete and barren: for when they have exhausted all their seed-eggs, of which they had but a certain quantity from the beginning, they must necessarily cease to lay, there being no new ones generated within."

The hen seldom clutches a brood of chickens above once a season, though instances have been known in which they produced two. The number of eggs a domestic hen will lay in the year are above 200, provided she be well fed and supplied with water and liberty. It matters not much whether she be trodden by the cock or no; she will continue to lay, although the eggs of this kind can never by hatching be brought to produce a living animal. Her nest is made without any care, if left to herself; a hole scratched into the ground, among a few bushes, is the only preparation she makes for this season of patient expectation. Nature, almost exhausted by its own fecundity, seems to inform her of the proper time for hatching, which she herself testifies by a clucking note, and by discontinuing to lay. The good housewives, who often get more by their hens laying than by their chickens, often artificially protract this clucking season, and sometimes entirely remove it. As soon as a hen begins to cluck, they stint her in her provisions; which, if that fails, they plunge her into cold water; this, for the time, effectually puts back her hatching; but then it often kills the poor bird, who takes cold and dies under the operation.

If left entirely to herself, the hen would seldom lay above 20 eggs in the same nest, without attempting to hatch them: but in proportion as she lays, her eggs are removed; and she continues to lay, vainly hoping to increase the number. In the wild state, the hen seldom lays above 15 eggs; but then her provision is more difficultly obtained, and she is perhaps sensible of the difficulty of maintaining too numerous a family.

When the hen begins to sit, nothing can exceed her perseverance and patience; she continues for some days immovable; and when forced away by the importunities of hunger, she quickly returns. Sometimes also her eggs become too hot for her to bear, especially if she be furnished with too warm a nest within doors, for then she is obliged to leave them to cool a little: thus the warmth of the nest only retards incubation, and often puts the brood a day or two back in the shell. While the hen sits, she carefully turns her eggs, and even removes them to different situations; till a length, in about three weeks, the young brood begin to give signs of a desire to burst their confinement. When by the repeated efforts of their bill, which serves like a pioneer on this occasion, they have broke themselves a passage through the shell, the hen still continues to sit

*Phasianus*Domestic
hen.

Phasianus till all are excluded. The strongest and best chickens generally are the first candidates for liberty; the weakest come behind, and some even die in the shell. When all are produced, she then leads them forth to provide for themselves. Her affection and her pride seem then to alter her very nature, and correct her imperfections. No longer voracious or cowardly, she abstains from all food that her young can swallow, and flies boldly at every creature that she thinks is likely to do them mischief. Whatever the invading animal be, she boldly attacks him; the horse, the hor, or the mastiff. When marching at the head of her little troop, she acts the commander; and has a variety of notes to call her numerous train to their food, or to warn them of approaching danger. Upon one of these occasions, the whole brood have been seen to run for security into the thickest part of an hedge, while the hen herself ventured boldly forth, and faced a fox that came for plunder.

Ten or twelve chickens are the greatest number that a good hen can rear and clutch at a time; but as this bears no proportion to the number of her eggs, schemes have been imagined to clutch all the eggs of an hen, and thus turn her produce to the greatest advantage. By these contrivances it has been obtained, that a hen that ordinarily produces but 12 chickens in the year, is found to produce as many chickens as eggs, and consequently often above 200. This contrivance is the artificial method of HATCHING chickens in flocks, as is practised at Grand Cairo; or in a chemical laboratory properly graduated, as has been effected by Mr Reaumur. At Grand Cairo, they thus produce 6000 or 7000 chickens at a time; where, as they are brought forth in their mild spring, which is warmer than our summer, the young ones thrive without clutching. But it is otherwise in our colder and unequal climate; the little animal may without much difficulty be hatched from the shell, but they almost all perish when excluded. To remedy this, Reaumur has made use of a woollen hen, as he calls it; which was nothing more than putting the young ones in a warm basket, and clapping over them a thick woollen canopy.

Capons may very easily be taught to clutch a fresh brood of chickens throughout the year; so that when one little colony is thus reared, another may be brought to succeed it. Nothing is more common than to see capons thus employed; and the manner of teaching them is this: First the capon is made very tame, so as to feed from one's hand; then, about evening, they pluck the feathers off his breast, and rub the bare skin with nettles; they then put the chickens to him, which presently run under his breast and belly, and probably rubbing his bare skin gently with their heads, allay the stinging pain which the nettles had just produced. This is repeated for two or three nights, till the animal takes an affection to the chickens that have thus given him relief, and continues to give them the protection they seek for: perhaps also the querulous voice of the chickens may be pleasing to him in misery, and invite him to succour the distressed. He from that time brings up a brood of chickens like a hen, clutching them, feeding them, clucking, and performing all the functions of the tenderest parent. A capon once accustomed to this service, will not give over; but when one brood is grown up, he may have another nearly

hatched put under him, which he will treat with the same tenderness he did the former.

The cock, from his insatiable appetites, is allowed to be a short-lived animal; but how long these birds live, if left to themselves, is not yet well ascertained by any historian. As they are kept only for profit, and in a few years become unfit for generation, there are few that, from mere motives of curiosity, will make the tedious experiment of maintaining a proper number till they die. Albinus hints their age to be 10 years; and it is probable that this may be its extent. They are subject to some disorders; and as for poisons, besides nux vomica, which is fatal to most animals except man, they are injured, as Linnaeus asserts, by elderberries; of which they are not a little fond.

Of this species Mr Latham enumerates no less than 13 varieties, beginning with the wild cock, which is a third less in the body than the domestic cock. This variety he imagines to be the original stock from whence all our domestic varieties have sprung. They appear to be natives of the forests of India. There are but few places, however, as Mr Latham goes on to observe, where the different voyagers have not met with cocks and hens, either wild or tame; and mention has been particularly made of finding them at St Jago, Pulo Condore, Isle of Timor, Philippine and Molucca Isles, Sumatra and Java, New Guinea, Tinian, and most of the isles of the South Seas. Those of Pulo Condore are very much like our own, but considerably less, being only of the size of a crow. The cocks crow like ours, but their voices are much more small and shrill.—*Damp. Voy.* vol. i. p. 392.—Two wild ones were shot there by our last voyagers.—*Emu's Narr.* ii. p. 340. Those of Sumatra and Java are remarkably large, and are called the *St Jago breed*. The cock is so tall as to peck off a common dining-table. When fatigued, he sits down on the first joint of the leg; and is then taller than the common fowls. *Hist. Sumatr.* p. 98. They are found in New Guinea, but not in great plenty.—*Farr. Voy.* p. 105. The fowls which were met with wild at Tinian “were run down without much trouble, as they could fear & fly farther than 100 yards at a flight.”—*Adams's Voy.* p. 416. Forster observes, that they are plenty at Easter, Society, and Friendly Isles: at the two last they are of a prodigious size. They are not uncommon at the Marquesas, Hebrides, and New Caledonia; but the L. w. Isles are quite destitute of them.—See *Obs.* p. 193.—Ducks and poultry are numerous in the Sandwich Isles.—*Cook's Journal*, p. 220. In respect to Europe, little need be said, as varieties without end are everywhere seen, and their manners fully known to every one. It is observed, however, that they breed most freely in the warmer situations. In the very cold regions, though they will live and thrive, they cease to multiply. They are not found to breed in the northern parts of Siberia; and in Greenland are only kept as rarities.—*Faun. Groenl.* On the whole, it seems quite unnecessary to enlarge further on a subject well known to every body. They are so common, that every one who wishes to become acquainted with their nature and manners, has the means of such knowledge in his power. Those who wish for minute descriptions, we must refer to the authors

Phasianus. who have professedly written on the subject; for the varieties which we have already mentioned, we refer to Mr Latham.

Pheasants. 2. The motmot, or Guinea pheasant, is brownish, somewhat red below, with a wedge-like tail, and wants spurs. 3. The colchicus is red, with a blue head, a wedge-shaped tail, and papillous cheeks. It is a native of Africa and Asia. 4. The argus is yellowish, with black spots, a red face, and a blue crest on the back part of the head. It is found in Chinese Tartary. 5. The pictus has a yellowish crest, a red breast, and a wedge-shaped tail. It is a native of China. 6. The netthemerus is white, with a black crest and belly, and a wedge-shaped tail. It is a native of China.

Mr Latham enumerates nine different species of pheasants, and of the common pheasant he reckons six varieties. The first which he describes is the superb pheasant. This bird Linnaeus described from the various representations of it painted on paper-hangings and China-ware; and farther confirmed by a figure and description in a Chinese book which came under his inspection.

*Latham's
Synopsis.*

"We have lately seen (says Latham) a drawing of the tail feather of a bird of the pheasant kind, which measured above six feet in length, and which, it is probable, must have belonged to some bird not hitherto come to our knowledge. The drawing is in the possession of Major Davies, who took it from the original feather; two of which were in the possession of a gentleman of his acquaintance, and were brought from China. They are exactly in shape of the two middle feathers of the painted pheasant; the general colour is that of a fine blue grey, margined on the sides with a rufous cream-colour, and marked on each side the shaft with numerous bars of black; between 70 and 80 bars in all; those on the opposite sides of the shaft seldom corresponding with each other.

"The argus, though it be a native of China, is very commonly found in the woods of Sumatra, where it is called *coo-owu*. It is found extremely difficult to be kept alive for any considerable time after catching it in the woods; never for more than a month. It seems to have an antipathy to the light, being quite inaginate in the open day; but when kept in a dark place, it appears perfectly at ease, and sometimes makes its note or call, from which it takes its name; and which is rather plaintive, and not harsh like that of a peacock. The flesh resembles that of the common pheasant."

Mr Latham observes, that the common pheasant is now found in a state of nature in almost the whole of the Old Continent. They sometimes (he says) come into farm yards near woods, and produce cross breeds with common hens. He then says, "M. Salerne remarks, that the hen-pheasant, when done laying and sitting, will get the plumage of the male, and after that become so little respected by him, as to be treated with the same incivility as he would show to one of his own sex. He mentions this as a new observation; but it is far more common than may be generally supposed, and had been long before mentioned by Edwards, who gave for example one kept in the menagerie of the duke of Leeds; and remarks, that this change is most likely to happen when in a con-

finer state. The circumstance of the hen acquiring the plumage of the cock after a certain time is not confined to the pheasant: the instance of the pea-hen belonging to Lady Tynte, now in the Leverian Museum, evinces the contrary, which, after having many broods, got much of the fine plumage of the cock, with the addition even of the fine train feathers. The female also of the rock manakin is said to get the plumage of the opposite sex after a number of years; and perhaps, if observed hereafter, this may be found to be the case with many other species. A gentleman of my acquaintance (continues our author), dead long since, who used to keep these birds for his amusement, observed the same to me; and the ingenious Mr J. Hunter has a well drawn up paper in the Philosophical Transactions* to the same purport; but, in * Vol. lxx. addition to this, I am well informed, that it does not P. 527. always require mature age to give the hen-pheasant the appearance of the male, as sometimes young birds will be adorned with his fine plumage. I will not say how this happens, and whether it may be peculiar to this species to grow barren (if that be the reason) sooner than any other of the gallinaceous tribe; but I am assured that several of these spurless, cock-like hens, have proved on eating to be young birds, from their juiciness and delicacy of flavour."

One of the varieties which our author remarks under this species, he calls the *Hybridal pheasant*, which is a mixed breed between the pheasant and cock; one of which is in the Leverian Museum. The two last species which our author describes, is the parraka and courier.

The parraka is about the size of a small fowl, resembling it in the bill, legs, and body. Its length is 23 inches. The colour of the bill is dark rufous; the eyes are brown; the general colour of the plumage is a deep brown on the back, and fulvous under the belly: the top of the head is fulvous, and the feathers are somewhat long, but not so much as to form a real crest; the wings are short; the webs of some of the quills are somewhat rufous; the tail consists of 12 feathers, is even at the end, about a foot in length, and is, for the most part, carried pendent; the legs are of a dark rufous, inclining to black; the claws are like those of a fowl.

"It is peculiar (says Mr Latham) in its internal structure in respect to the windpipe; which, instead of entering directly the breast, as in most birds, passes over the side of the left clavicle, and on the outside of the fleshy part of the breast, being covered only by the skin, then taking a turn upwards, passes over the right clavicle into the breast, and is distributed through the lungs in the usual way. The female has not this circumvolution of the windpipe. The hannequaw, mentioned by Bancroft, is probably the same bird. He says that it is black, roosts in trees, and may be heard early in the morning, distinctly, but hoarsely, repeating the word *hannequaw* (easily mistaken for *parrequaw*) very loud. These are found in the unfrequented woods of the internal parts of Cayenne, Guiana, and many parts of South America. At sun-rise they set up a very loud cry, which is thought to be the loudest of all birds in the new world; at which time the eyes appear red, as does a small skin under the breast, which is not at all seen, except when the bird

Phasianus. bird makes such exertions, or is angry. This cry is very like the word parraquaw; and is repeated many times together; and often many cry at once, or answer one another, but most in breeding-time, which is twice in the year; at each time laying from four to six eggs; making the nest in low branches or stumps of trees, and behaving with their chickens in the same manner as hens. They feed on grain, seeds, and herbs; but feed the young in the nest with worms and small insects. These, with many other birds, inhabit the woods by day, coming out into the open savannas morning and evening to feed; at which times they are chiefly killed by the natives and near inhabitants. They may be brought up tame; and their flesh is much esteemed.

"The courier pheasant is but very imperfectly described by Fernandez; and is said to be 18 inches long. The general colour of the plumage is white, inclined to fulvous; about the tail they are black, mixed with some spots of white; the tail itself is long, and of a green colour, reflecting in some lights like the feathers of a peacock: the wings are short. This species inhabits the hotter parts of Mexico; flies slow; but is recorded to outrun the swiftest horse*."

* *Hist. des Indes.*

Pheasants were originally brought into Europe from the banks of the Phasis, a river of Colchis, in Asia Minor; and from whence they still retain their name. Next to the peacock, they are the most beautiful of birds, as well for the vivid colour of their plumes as for their happy mixtures and variety. It is far beyond the power of the pencil to draw any thing so glossy, so bright, or points so finely blending into each other. We are told, that when Cræsus, king of Lydia, was seated on his throne, adorned with royal magnificence and all the barbarous pomp of eastern splendor, he asked Solon if he had ever beheld any thing so fine? The Greek philosopher, no way moved by the objects before him, or taking a pride in his native simplicity, replied, That after having seen the beautiful plumage of the pheasant, he could be astonished at no other finery.

These birds, tho' so beautiful to the eye, are not less

delicate when served up to the table. Their flesh is considered as the greatest dainty; and when the old physicians spoke of the wholesomeness of any viands, they made their comparison with the flesh of the pheasant. However, notwithstanding all these perfections to tempt the curiosity or the palate, the pheasant has multiplied in its wild state.

A spirit of independence seems to attend the pheasant even in captivity. In the woods, the hen-pheasant lays from 18 to 20 eggs in a season; but in a domestic state, she seldom lays above 10. In the same manner, when wild, she hatches and leads up her brood with patience, vigilance, and courage; but when kept tame, she never sits well, so that a hen is generally her substitute upon such occasions: and as for leading her young to their food, she is utterly ignorant of where it is to be found; and the young birds starve, if left solely to her protection. The pheasant, therefore, on every account, seems better left at large in the woods than reclaimed to pristine captivity. Its fecundity when wild is sufficient to stock the forest; its beautiful plumage adorns it; and its flesh retains a higher flavour from its unlimited freedom.

However, it has been the aim of late to take these birds once more from the woods, and to keep them in places fitted for their reception. Like all others of the poultry kind, they have no great sagacity, and suffer themselves easily to be taken. At night they roost upon the highest trees of the wood; and by day they come down into the lower brakes and bushes, where their food is chiefly found. They generally make a kind of flapping noise when they are with the females; and this often apprises the sportsman (A) of their retreats. At other times he traces them in the snow, and frequently takes them in springs. But of all birds they are shot most easily; as they always make a whirring noise when they rise, by which they alarm the gunner, and being a large mark, and flying very slow, there is scarce any missing them.

When these birds are taken young into keeping, they become as familiar as chickens: and when they are designed for breeding, they are put together in a yard,

(A) Pheasants may be taken in a variety of ways. One method is, to be well acquainted with their haunts and breeding-places; which are generally young, thick, and well grown coppices, free from the disturbances of cattle, and without a path way through them; for they are timorous birds. When their haunts are discovered, it will next be necessary to find out where the brood is. And here it is to be remarked, that pheasants come out of the wood three times a day to feed in green corn, fresh pastures, or such like places. The times of coming out are in the morning soon after sunrise, at noon, and at sunset. The sides of the wood where they may be supposed to come out ought then to be carefully watched, and the young ones will be seen following the female as a flock of chickens follow the hen. The wood ought also to be watched in the evenings, when the noise of the cock and hen calling the young ones together will soon be heard; and the sportsman must then endeavour to get as near as he can to the place; and being very still and silent, he may observe their numbers and disposition, and learn how to spread his nets for a most easy to take the whole brood; but if by the least motion they discover him, they will all take to their legs, and run to a great distance; for they seldom rise on the wing, except when very close frightened. By practice some people have become able to imitate the voice of the old pheasant, so as to be able to call the young ones together to any place that he pleases, when the haunts are once found out, and by this means they are easily led into the nets.—The best time for using this call is in the morning or evening; and the note imitated should be that by which they are called out to feed; indeed, by learning to imitate the other notes, they may be brought together at any time of the day. The sportsman who can make this call, must shelter himself in some close place, and be very softly at first; then, if none are near enough to be within hearing, he is gradually to raise it louder and louder, and at length he will be answered as loud, if any are within hearing, though at a considerable distance.

Pheasant.

Pheasant.

yard, first hens to a cock; for this bird, like all of the poultry kind, is very fatious. In her natural state the female makes her nest of dry weeds and leaves; the same must be put for her in the pheasantry, and the hen will sometimes properly dispose them. If she refuses to hatch her eggs, a cunning woman hen must be got to supply her place, which task she will perform with perseverance and success. The young ones are very difficult to be reared; and they must be supplied with insects, which is the food the old one leads them to gather when well in the woods. To make these go the farther, they are to be chopped up with cur's or other meat; and the young ones are to be fed with great exactness, both as to the quantity and the time of their supply. This food is sometimes also to be varied; and wood lice, earwigs, and other insects, are to make a variety. The place where they are reared must be kept extremely clean; their water must be changed twice or thrice a day; they must not be exposed till the dew is off the ground in the morning, and they should always be taken in before sunset. When they become adult, they very well can shift for themselves; but they are particularly fond of oats and barley.

In order to increase the breed, and make it still more valuable, Longolius teaches us a method that appears very peculiar. The pheasant is a very bold bird when first brought into the yard among other poultry, not sparing the peacock, nor even such young cocks and hens as it can master; but after a time it will live tamely among them, and will at last be brought to couple with a common hen. The breed thus produced take much stronger after the pheasant than the hen; and in a few successions, if they be let to breed with the cock-pheasant (for the mixture is not barren), there will be produced a species more tame, stronger, and more prolific; so that he adds, that it is strange why most of our pheasantries are not stocked with birds produced in this manner.

The pheasant, when full grown, seems to feed indifferently upon every thing that offers. It is said by a French writer, that one of the king's sportsmen shooting at a parcel of crows that were gathered round a dead carcass, to his great surprise, upon coming up, found that he had killed as many pheasants as crows. It is even asserted by some, that such is the carnivorous disposition of this bird, that when several of them are put together in the same yard, if one of them

stance; whereas, if he should set up the call too loud at first, and any of the birds should happen to be very near, they would be frightened away.

When a pheasant answers, the sportsman is to creep nearer and nearer, still calling, though not so loud; and he will still be answered, till at length he will be led by the bird's voice within sight of it. Then he is to spread his net, and to begin to call again, keeping in some close and well sheltered place behind the net; in this place he is to call till the bird approaches; and when he has drawn it under the net, he is to appear suddenly, and the bird, rising up, will thus be caught.

There is another method of taking pheasants much quicker than that we have just described, viz. the having a live cock pheasant to use as a stake: this bird is to be fixed under the net, and by his crowing he will soon entice others in. The sportsman must lie concealed; and when another pheasant comes in, he is to draw the net over him. Many people take pheasants in springes or horse hair snares: to succeed in this, it will be necessary to be careful in searching out their haunts, and the places by which they go out of the woods into the field's. When these are discovered, a peg must be fixed in the ground at each, and at each peg two springes must be laid open; the one to take in the legs, the other the head. When the springes are set, the sportsman must go into the woods, and get behind the birds in order to fright them with some little noise, such as shall not be enough to raise them to the wing, but only to set them a-running. They will naturally make their way out of the wood, through their accustomed paths, and be then caught in the springes.

There is another method of taking these birds in winter, provided there be no snow. This must be done with a net made in the form of a casting net, but with wider meshes; they may indeed be five inches wide. Some peas or wheat are to be taken out; and the path of the pheasants being discovered, which may easily be done by their dung, a pint or thereabout of corn is to be thrown down in the path in a place marked, so that the sportsman can come to it again. This must be done for some days, till at length the pheasants will expect it every day regularly; and all of them that frequent the place are brought together to feed there, and then the net is to be fixed over the place; its top being tied up to some bough of a tree, and its bottom fixed down all around, except in one place, where the walk of the pheasants lies. In this place it must be raised in the form of an arch, and the entrance must be lined with several rods of hazel; the thick ends of which are to be tied to the net, and the thin ones let into the space covered by it; and thus the pheasants will easily get in by parting the small ends of the sticks, as fish into a wheel, but they will not easily get out again. The nets are to be dyed of a russet colour, by laying them in a tan-pit; and they must, when planted for this purpose, be covered with boughs, so that the birds do not discover them, and then they will easily run into them, and be all taken at once.

(B) The pheasant is so nearly allied to our common poultry that this assertion may appear odd: it is nevertheless true; and the principal cause may be, that their proper food is not known, or not sufficiently inquired into. They feed voraciously on ants and various other insects; and it is said, that when the multitude of corn or wheat of cleanliness in their apartments has made them sick, a repast of ants has recovered them. When these fail, millepedes and earwigs together answer as an excellent medicine, along with their common food (corn), which must be very sweet and clean. These birds are very fatten, and when coupling time is over, they are seldom found more than one in a place.

Phasis
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Phaffa-
chates.

them happens to fall sick, or seems to be pining, all the rest will fall upon, kill, and devour it. Such is the language of books; those who have frequent opportunities of examining the manners of the bird itself, know what credit ought to be given to such an account.

PHASIS, a river which falls into the Euxine sea about 700 miles from Constantinople. "From the Iberian Caucasus (says Gibbon), the most lofty and craggy mountains of Asia, that river descends with such oblique vehemence, that in a short space it is traversed by 120 bridges. Nor does the stream become placid and navigable till it reaches the town of Sarapana, five days journey from the Cyrus, which flows from the same hills, but in a contrary direction, to the Caspian lake. The proximity of these rivers has suggested the practice, or at least the idea, of wafting the precious merchandize of India down the Oxus, over the Caspian, up the Cyrus, and with the current of the Phasis into the Euxine and Mediterranean seas. As it successively collects the streams of the plain of Colchoa, the Phasis moves with diminished speed, tho' accumulated weight. At the mouth it is 60 fathoms deep, and half a league broad; but a small woody island is interposed in the midst of the channel: the water, so soon as it has deposited an earthy or metallic sediment, floats on the surface of the waves, and is no longer susceptible of corruption. In a course of 100 miles, 40 of which are navigable for large vessels, the Phasis divides the celebrated region of Colchos or Mingrelia, which, on three sides, is fortified by the Iberian and Armenian mountains, and whose maritime coast extends about 200 miles, from the neighbourhood of Trebizond to Dioscurias and the confines of Circassia. Both the soil and climate are relaxed by excessive moisture: 28 rivers, besides the Phasis and his dependent streams, convey their waters to the sea; and the hollowness of the ground appears to indicate the subterraneous channels between the Euxine and the Caspian."

PHASMATA, in physiology, certain appearances arising from the various tinctures of the clouds by the rays of the heavenly bodies, especially the sun and moon. These are infinitely diversified by the different figures and situations of the clouds, and the appulses of the rays of light; and, together with the occasional flashings and shootings of different meteors, they have, no doubt, occasioned those prodigies of armies fighting in the air, &c. of which we have such frequent accounts in most sorts of writers. See 2 Maccab. xi. 8. Melancth Meteor. 2 Shel. de Comet. ann. 1618.

Kircher and Schottus have erroneously attempted to explain the phenomenon from the reflection of terrestrial objects made on opaque and congealed clouds in the middle region of the air, which, according to them, have the effect of a mirror. Thus, according to these authors, the armies pretended by several historians to have been seen in the skies, were no other than the reflection of the like armies placed on some part of the earth. See Hist. Acad. Roy. Scienc. ann. 1726, p. 405, & seq.

PHASSACHATES, in natural history, the name of a species of agate, which the ancients, in its various appearances, sometimes called *leucachates* and *perileucos*.

Pheasant
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Pheasant-
dream.

PHEASANT, in ornithology. See PHASIANUS.

PHEASANT's-eye, or Bird's-eye. See ADONIS.

PHEBE, a deaconess of the port of Corinth, called *Cenchrea*. St Paul had a particular esteem for this holy woman; and Theodoret thinks the apostle lodged at her house for some time, while he continued in or near Corinth. It is thought he brought to Rome the epistle he wrote to the Romans, wherein she is commended and recommended in so advantageous a manner. He says (Rom. xvi. 1, 2.), "I commend unto you Phebe our sister, which is a servant of the church which is at Cenchrea: that ye receive her in the Lord, as becometh saints, and that ye assist her in whatsoever business she hath need of you; for she hath been a succourer of many, and of myself also." Some moderns have advanced a notion, that Phebe was wife to St Paul; but none of the ancients have said any thing like it. It is thought, in quality of deaconess, she was employed by the church in some ministrations suitable to her sex and condition; as to visit and instruct the Christian women, to attend them in their sickness, and distribute alms to them.

PHEGOR, or PEOR, a deity worshipped at a very early period by the Midianites and Moabites, and probably by all the other tribes which then inhabited Syria. Much has been said concerning the functions of this god, and the rank which he held among the Pagan divinities (see *BAAL-PEOR*); and many conjectures have been formed concerning the origin of his name. Most of these seem to have no better foundation than the senseless dreams of the Jewish rabbies. PHEGOR, or PEOR, is undoubtedly the same with the Hebrew word *pechor*, which signifies *aperuit*, and probably refers to the prophetic influence always attributed to the solar deity, by which he opened or discovered things to come. Accordingly we find PHEGOR or PEOR generally joined to *Baal*, which was the Syrian and Chaldean name of the sun after he became an object of worship; hence *Baal-Phegor* must have been the sun worshipped by some particular rites, or under some particular character. What these were, a resolution of *pechor* into its component parts may perhaps inform us. As this word, wherever it occurs in Scripture, has some relation to distending or opening the mouth wide, it is probably compounded of *PAH* the *mouth* or *face*, and *EHAR* *naked*. In those countries we know that the women wore veils; but it would appear, that in celebrating the rites of this deity they were unveiled. It seems even not improbable, that on these occasions the sexes danced promiscuously without their clothes; a practice which would naturally give birth to the licentious amours mentioned in the 25th chapter of the book of Numbers. If this be admitted, it will follow that *Phegor* was the sun presiding over the mysteries of Venus.

PHELLANDRIUM, WATER-HEMLOCK; a genus of the digynia order, belonging to the pentandria class of plants. There are two species, one of which, viz. the aquaticum, is a native of Britain. This grows in ditches and ponds, but is not very common. The stalk is remarkably thick and dichotomous, and grows in the water. It is a poison to horses, bringing upon them, as Linnæus informs us, a kind of palsy; which, however, he supposes to be owing not so much to the noxious qualities of the plant itself, as to those of an

Phengites
Phere-
crates.

insect which feeds upon it, breeding within the stalks, and which he calls *circulio paraphrostus*. The Swedes give swine's dung for the cure. The seeds are sometimes given in intermittent fevers, and the leaves are by some added to discutient cataplasms. In the winter, the roots and stem, dissected by the influence of the weather, afford a very curious skeleton or network. Horses, sheep, and goats, eat the plant; swine are not fond of it; cows refuse it.

Hist. Hist.
of Egypt,
p. 490.

PHENGITES, among the ancients, the name of a beautiful species of alabaster. It is a rude irregular mass, very shattery and friable, but of a brightness superior to that of most other marbles, and excelling them all in transparency. The colour is an agreeable pale, yellowish, white, or honey colour; the yellowish is more intense in some places than in others, and sometimes makes an obscure resemblance of veins. It is very weak and brittle in the mass; and when reduced to small pieces, may be easily crumbled between the fingers into loose, but considerably large angular pieces, some perfect, others complex, irregular, or mutilated, and all approaching to a flat shape. The ancients were very fond of this species in public buildings; and the Temple of Fortune, built entirely of it, has long been celebrated. Its great beauty is its transparency, from which alone this temple was perfectly light when the doors were shut, though it was built without a window, and had no other light but what was transmitted through the stone its walls were built with. It was anciently found in Cappadocia, and is still plentiful there: we have it also in Germany and France, and in our own kingdom in Derbyshire, and some other counties. It takes an excellent polish, and is very fit for ornamental works, where there is no great strength required. See **AMETHYST**.

PHENICE, a port of the island of Crete, to the west of the island. St Paul having anchored at Phenice, when he was carried to Rome (Acts xxvii. 12.), advised the ship's crew to spend the winter there, because the season was too far advanced.

PHENICIA. See **PHOENICIA**.

PHEONS, in heraldry, the barbed heads of darts, arrows, or other weapons.

PHEOS, in botany, a name which Theophrastus, Dioscorides, and others, give to a plant used by fullers in dressing their cloths, and of which there were two kinds, a smaller called simply *pheos*, and a larger called *hippopheos*. This plant is sometimes called *phleas*; and is thus confounded with a kind of marsh cudweed, or *gnaphalium*, called also by that name; but it may always be discovered which of the two plants an author means, by observing the sense in which the word is used, and the use to which the plant was put. The *phleas*, properly so called, that is, the cudweed, was used to stuff beds and other such things, and to pack up with earthen vessels to prevent their breaking; but the *pheos*, improperly called *phleas*, only about cloths: this was, however, also called *stabe* and *cnaphon*.

PHERECRATES, a Greek comic poet, was contemporary with Plato and Aristophanes. After the example of the ancient comedians, who never introduced upon the theatre imaginary but living characters, he acted his contemporaries. But he did not abuse the liberty which at that time prevailed upon the stage;

Phere-
crates.

and laid it down as a rule to himself never to destroy the reputation of any person. Twenty-one comedies are attributed to him, of which there now only remain some fragments collected by Hertelius and Grotius. From these fragments, however, it is easy to discern, that Pherecrates wrote the purest Greek, and possessed that ingenious and delicate raillery which is called *artistic urbanity*. He was author of a kind of verse called, from his own name, *Pherecratick*. The three last feet were in hexameter verse, and the first of those three feet was always a spondee. This verse of Horace (for example, *Quamvis portus pinus*) is a Pherecratick verse. We find in Plutarch a fragment of this poet upon the music of the Greeks, which has been critically examined by M. Burette of the academy of inscriptions. See the 15th volume of the collection published by that learned society.

PHERECYDES, a native of Scyros, flourished about the year 560 before the Christian era, and was disciple of Pittacus, one of the seven wise men of Greece (see **PITTACUS**). He is said to have been the first of all the philosophers who has written on natural subjects and the essence of the gods. He was also the first, it is said, who held the ridiculous opinion, "that animals are mere machines." He was Pythagoras's master, who loved him as his own father. This grateful scholar having heard that Pherecydes lay dangerously ill in the island of Delos, immediately repaired thither, in order to give every necessary assistance to the old man, and to take care that no means should be left untried for the recovery of his health. His great age, however, and the violence of his disease, having rendered every prescription ineffectual, his next care was to see him decently buried; and when he had paid the last duty to his remains, and erected a monument to his memory, he set out again for Italy. Other causes have been assigned for the death of Pherecydes: some say he was eaten up by lice, and others that he fell headlong from the top of Mount Corycius in his way to Delphos. He lived to the age of 85 years, and was one of the first prose writers among the Greeks.

"Marvellous circumstances have been related of him, which only deserve to be mentioned, in order to show that what has been deemed supernatural by ignorant spectators may be easily conceived to have happened from natural causes. A ship in full sail was at a distance approaching its harbour; Pherecydes predicted that it would never come into the haven, and it happened accordingly; for a storm arose which sunk the vessel. After drinking water from a well, he predicted an earthquake, which happened three days afterwards. It is easy to suppose that these predictions might have been the result of a careful observation of those phenomena which commonly precede storms or earthquakes in a climate where they frequently happen.

"It is difficult to give in any degree an accurate account of the doctrines of Pherecydes; both because he delivered them, after the manner of the times, under the concealment of symbols; and because very few memoirs of this philosopher remain. It is most probable that he taught those opinions concerning the gods and the origin of the world which the ancient Grecian theologians borrowed from Egypt;" and of which the reader will find accounts in different articles

Pheretima cles of this work. See EGYPT, METAPHYSICS, MYSTERIES, MYTHOLOGY, and POYRISM.

Phidias PHERETIMA, was the wife of Battus king of Cyrene, and the mother of Arcesilaus. After her son's death, she recovered the kingdom by means of Amasis king of Egypt, and to avenge the murder of Arcesilaus, she caused all his assassins to be crucified round the walls of Cyrene, and she cut off the breasts of their wives, and hung them up near the bodies of their husbands. It is said that she was devoured alive by worms; a punishment which, according to some of the ancients, was inflicted by Providence for her unparalleled cruelties.

PHERON, was a king of Egypt, who succeeded Sesostris. He was blind; and he recovered his sight by washing his eyes, according to the directions of the oracle, in the urine of a woman who had never had any unlawful connections. He tried his wife first, but she appeared to have been faithful to his bed, and she was burnt with all those whose urine could not restore sight to the king. He married the woman whose urine proved beneficial.

PHIAL, a well-known vessel made of glass, used for various purposes.

Leyden PHIAL, is a phial of glass coated on both sides with tin-foil for a considerable way up the sides, of great use in electrical experiments. See ELECTRICITY, *passim*.

PHIDIAS, the most famous sculptor of antiquity, was an Athenian, and a contemporary of the celebrated Pericles, who flourished in the 83d Olympiad. This wonderful artist was not only consummate in the use of his tools, but accomplished in those sciences and branches of knowledge which belong to his profession, as history, poetry, fable, geometry, optics, &c. He first taught the Greeks to imitate nature perfectly in this way; and all his works were received with admiration. They were also incredibly numerous; for it was almost peculiar to Phidias, that he united the greatest facility with the greatest perfection. His Nemesis was ranked among his first pieces: it was carved out of a block of marble, which was found in the camp of the Persians after they were defeated in the plains of Marathon. He made an excellent statue of Minerva for the Plateans; but the statue of this goddess in her magnificent temple at Athens, of which there are still some ruined remains, was an astonishing production of human art. Pericles, who had the care of this pompous edifice, gave orders to Phidias, whose prodigious talents he well knew, to make a statue of the goddess; and Phidias formed a figure of ivory and gold 39 feet high. Writers never speak of this illustrious monument of skill without raptures; yet what has rendered the name of the artist immortal, proved at that time his ruin. He had carved upon the shield of the goddess his own portrait and that of Pericles; and this was, by those that envied them, made a crime in Phidias. He was also charged with embezzling part of the materials which were designed for the statue. Upon this he withdrew to Elis, and revenged himself upon the ungrateful Athenians, by making for the Elians the Olympic Jupiter; a prodigy of art, and which was afterwards ranked among the seven wonders of the world. It was of ivory and gold; 60 feet high, and

every way proportioned. "The majesty of the work did equal the majesty of the god (says Quintilian), and its beauty seems to have added lustre to the religion of the country." Phidias concluded his labours with this masterpiece; and the Elians, to do honour to his memory, erected, and appropriated to his descendants, an office, which consisted in keeping clean this magnificent image.

PHIDITIA, in Grecian antiquity, feasts celebrated with great frugality at Sparta. They were held in the public places and in the open air. Rich and poor assisted at them equally, and on the same footing; their design being to keep up peace, friendship, good understanding, and equality among the citizens great and small. It is said that those who attended this feast brought each a bushel of flour, eight measures of wine named *chorus*, five mince of cheese, and as many figs.

PHILA, in mythology, one of the attributes of Venus, which distinguishes her as the mother of love, from *Proserpine* to love.

PHILADELPHIA, in antiquity, were games instituted at Sardis to celebrate the union of Caracalla and Geta, the sons of Septimius Severus.

PHILADELPHIA, the capital of the state of Pennsylvania in North America, situated in W. Long. 75. 8. N. Lat. 39. 57. It is one of the most beautiful and regular cities in the world, being of an oblong form, situated on the west bank of the river Delaware, on an extensive plain, about 118 miles (some say more) from the sea. The length of the city east and west, that is, from the Delaware to the Schuylkill, upon the original plan of Mr Penn, is 10,300 feet, and the breadth, north and south, is 4837 feet. Not two fifths of the plot covered by the city charter is yet built. The inhabitants, however, have not confined themselves within the original limits of the city, but have built north and south along the Delaware two miles in length. The longest street is Second-street, about 700 feet from Delaware river, and parallel to it. The circumference of that part of the city which is built, if we include Kensington on the north and Southwark on the south, may be about five miles. Market-street is 100 feet wide, and runs the whole length of the city from river to river. Near the middle, it is intersected at right angles by Broad-street, 113 feet wide, running nearly north and south quite across the city.

Between Delaware river and Broad-street are 14 streets, nearly equidistant, running parallel with Broad-street across the city; and between Broad-street and the Schuylkill, there are nine streets equidistant from each other. Parallel to Market-street are eight other streets, running east and west from river to river, and intersect the cross streets at right angles; all these streets are 50 feet wide, except Arch-street, which is 65 feet wide. All the streets which run north and south, except Broad-street mentioned above, are 30 feet wide. There were four squares of eight acres each, one at each corner of the city, originally reserved for public and common uses. And in the centre of the city, where Broad-street and Market-street intersect each other, is a square of ten acres, reserved in like manner, to be planted with rows of trees for public walks. This city was founded in 1682 by the celebrated

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celebrated William Penn, who in October 1701 granted a charter incorporating the town with city privileges. In 1749 the dwelling houses were computed, and found to be 2076; in 1790, they amounted to 5000. They are in general handsomely built of brick; and contain 40,000 inhabitants, composed of almost all nations and religions. Their places for religious worship are as follow: The Friends or Quakers have five, the Presbyterians six, the Episcopalians three, the German Lutherans two, the German Calvinists one, the Catholics three, the Swedish Lutherans one, the Moravians one, the Baptists one, the Universal Baptists one, the Methodists one, the Jews one.

The other public buildings in the city, besides the university, academies, &c. are the following, viz. a state-house and offices; a city court-house, a county court-house, a carpenter's hall, a philosophical society's hall, a dispensary, an hospital and offices, an alms-house, a house of correction; a public factory of linen, cotton, and woollen, a public observatory, three brick market houses, a fish-market, a public gaol.

The university of Philadelphia was founded during the war. Its funds were partly given by the state, and partly taken from the old college of Philadelphia. A medical school, which was founded in 1765, is attached to the university; and has professors in all the branches of medicine, who prepare the students (whose number yearly is 50 or 60) for degrees in that science. Besides the university and medical school, there is the Protestant Episcopal academy, a very flourishing institution; the academy for young ladies; another for the Friends or Quakers, and one for the Germans; besides five free schools.

In Market-street, between Front and Fourth streets, is the principal market, built of brick, and is 1500 feet in length. This market, in respect to the quantity, the variety, and neatness of the provisions, is not equalled in America, and perhaps not exceeded in the world.

The Philadelphians are not so social, nor perhaps so hospitable, as the people in Boston, Charlestown, and New York. Various causes have contributed to this difference; among which the most operative has been the prevalence of party-spirit, which has been and is carried to greater lengths in this city than in any other in America; yet no city can boast of so many useful improvements in manufactures, in the mechanical arts, in the art of healing, and particularly in the science of humanity. In short, whether we consider the convenient local situation, the size, the beauty, the variety and utility of the improvements, in mechanics, in agriculture, and manufactures, or the industry, the enterprise, the humanity, and the abilities, of the inhabitants of the city of Philadelphia, it merits to be viewed as the capital not only of the province, but of the flourishing empire of United America.

Several canals are let into the town, which add much to the beauty and convenience of the place. Its quay is 200 feet square, to which ships of 400 or 500 tons may come up, and lay their broadsides close to it; with wet and dry docks for building and repairing ships, besides magazines, warehouses, and all other conveniences for exporting and importing merchandise. Scarce any thing can appear more beautiful than the city and the adjacent country, which for some

miles may be compared to a fine and flourishing garden.

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Though all our readers must unquestionably have heard of the malignant fever which so lately raged in Philadelphia, yet as some of them may not be so well acquainted with particulars, it will not, we trust, be thought improper if we give a short account of that dreadful malady in this place. This account we shall extract from a pamphlet written by Matthew Carey, which had run through no less than three editions before the end of the last year.

Of this fever, then, it is observed, that, generally speaking, the mortality was not so great among women as among men, but that corpulent, high-fed, and drunken men, common prostitutes, and such of the poor as had been debilitated through the want of sufficient nourishment, and lived in dirty and confined habitations, became an easy prey to it; whilst those who resided in the suburbs, enjoying the benefit of country air, were little affected by it. A singular fact is, that the French residing in Philadelphia were in a remarkable degree exempt from it; a circumstance which cannot be accounted for. The report which prevailed here of the Africans having wholly escaped the disease, proves to be not altogether true, several of them having been seized. The fever, however, was found to yield more readily to medicine in them than in white persons.

We find the following account of the nature and symptoms of the disease, as described by Dr Currie, in the third edition of the pamphlet already mentioned. "The symptoms which characterised the first stage of the fever were, in the greatest number of cases, after a chilly fit of some duration, a quick tense pulse; hot skin; pain in the head, back, and limbs; flushed countenance; inflamed eye, moist tongue; oppression and sense of foreness at the stomach, especially upon pressure; frequent sick qualms, and retchings to vomit, without discharging any thing, except the contents last taken into the stomach; costiveness, &c. And when stools were procured, the first generally showed a defect of bile, or an obstruction to its entrance into the intestines. But brisk purges generally altered this appearance.

"These symptoms generally continued with more or less violence from one to three, four, or even five days; and then gradually abating, left the patient free from every complaint, except general debility. On the febrile symptoms suddenly subsiding, they were immediately succeeded by a yellow tinge in the opaque cornea, or whites of the eyes; an increased oppression at the præcordia, a constant puking of every thing taken into the stomach, with much straining, accompanied with a hoarse hollow noise.

"If these symptoms were not soon relieved, a vomiting of matter resembling coffee-grounds in colour and consistence, commonly called the *black vomit*, sometimes accompanied with or succeeded by hemorrhages from the nose, fauces, gums, and other parts of the body; a yellowish purple colour, and putrescent appearance of the whole body, hiccup, agitations, deep and distressed sighing, comatose delirium, and finally death, are the consequence. When the disease proved fatal, it was generally between the fifth and eighth days.

"This was the most usual progress of this formidable

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midable disease through its several stages. There were, however, very considerable variations in the symptoms as well as in the duration of its different stages, according to the constitution and temperament of the patient, the state of the weather, the manner of treatment, &c.

"In some cases, signs of putrefecency appeared at the beginning or before the end of the third day. In these, the black vomiting, which was generally a mortal symptom, and universal yellowness, appeared early. In these cases, also, a low delirium, and great prostration of strength, were constant symptoms, and coma came on very speedily.

"In some, the symptoms inclined more to the nervous than the inflammatory type. In these, the jaundice colour of the eye and skin, and the black vomiting, were more rare. But in the majority of cases, particularly after the nights became sensibly cooler, all the symptoms indicated violent irritation and inflammatory diathesis. In these cases, the skin was always dry, and the remissions very obscure.

"The febrile symptoms, however, as has been already observed, either gave way on the third, fourth, or fifth day, and then the patient recovered; or they were soon after succeeded by a different but much more dangerous train of symptoms, by debility, low pulse, cold skin (which assumed a tawny colour, mixed with purple), black vomiting, hemorrhagies, hiccup, anxiety, restlessness, coma, &c. Many who survived the eighth day, though apparently out of danger, died suddenly in consequence of an hemorrhage."

Purging the patient with calomel and jalap appears to have proved the most successful treatment; and the repeated use of the lancet, in cases where no symptoms of putridity existed. Dr Griffiths, who had been seized with the disease, "was bled seven times in five days, and ascribes his recovery principally to that operation." Dr Macle also, "in five days, lost 72 ounces of blood, by which he was recovered when at the lowest stage of the disorder." It was generally remarked that an obstinate costiveness took place at the commencement of the disease; and when this was removed, by purgatives, within the first twelve hours, the patient seldom failed to do well.

The work concludes with a list of the committee for the relief of the sick, of which our author was a member: also the names of a large number of the inhabitants who were cut off, a series of meteorological tables, and a general account of burials during the prevalence of this fatal complaint. From the latter we extract the following account:

" August	-	-	325
" September	-	-	1442
" October	-	-	1993
" November	-	-	118
" Jews, returned in gross	-	-	5
" Baptists, do.	-	-	60
" Methodists, do.	-	-	32
" Free Quakers, do.	-	-	39
" German part of St Mary's congregation	-	-	30

Total 4042"

It is not difficult to conceive the general distress which such an evil must have occasioned to persons of every rank and description. Some of the most striking instances our author has related in very affecting terms;

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but no picture of human calamity perhaps ever exceeded the following: "A servant girl belonging to a family in this city, in which the fever had prevailed, was apprehensive of danger, and resolved to remove to a relation's house in the country. She was, however, taken sick on the road, and returned to town, where she could find no person to receive her. One of the guardians of the poor provided a cart, and took her to the alms-house, into which she was refused admittance. She was brought back, and the guardian offered five dollars to procure her a single night's lodging, but in vain. And in fine, after every effort made to provide her shelter, she absolutely expired in the cart."

We cannot dismiss the present article, though it has already extended to a sufficient length, without giving our readers an account of a very extraordinary people who live within 50 miles of Philadelphia; where there is a little town or colony, particularly remarkable on account of its origin and the manners of the people by whom it is inhabited. It was founded by a German, who, weary of the world, returned into the country that he might be more at liberty to give himself up to contemplation. Curiosity brought several of his countrymen to visit his retreat; and by degrees his pious, simple, and peaceable manners, induced them to settle near him; when they all formed a little colony, which they called *Euphrates*, in allusion to the Hebrews, who used to sing psalms on the borders of that river.

This little town forms a triangle, the outsidcs of which are bordered with mulberry and apple-trees planted with great regularity; and its inhabitants, we know not for what reason, are called *Dumplers*. In the middle of the town is a very large orchard, and between the orchard and those ranges of trees are houses built of wood, three stories high, where every Dumper is left to enjoy the pleasures of his meditation without disturbance. These contemplative men do not amount to above 500; and the extent of their territory is about 250 acres, bounded by a river, a piece of stagnated water, and a mountain covered with trees.

The men and women live in separate quarters of the town, and never see each other but at places of worship; for among the Dumplers there are no assemblies of any kind but for public business. Their lives are spent in labour, prayer, and sleep. Twice every day and night they are called forth from their cells to attend divine service. Like the Methodists and Quakers, every individual among them has the right of preaching when he thinks himself inspired. The favourite subjects on which they discourse in their assemblies, are humility, temperance, chastity, and the other Christian virtues. They never violate that day of repose which all orders of men, whether idle or luxurious, much delight in. They admit a hell and a paradise; but reject the eternity of future punishments. They abhor the doctrine of original sin as an impious blasphemy; and, in general, every tenet that is severe to men appears to them injurious to the Divinity. As they do not allow ment to any but voluntary works, they administer baptism only to the adult; at the same time, they think baptism so essentially necessary to salvation, that they imagine the souls of Christians

Philadel- **ph**ians in another world are employed in converting those who have not died under the law of the Gospel. In this ridiculous opinion we have known Christians of other denominations, and who boasted a higher antiquity, that agreed with them.

Still more disinterested than the Quakers, they never enter into any law suit. One may cheat, rob, and abuse them, without being exposed to any retaliation, or even to any complaint from them. On them religion has the same effect that philosophy had upon the Stoics: it makes them insensible to every kind of insult.

Nothing can be plainer than their dress. In winter it is a long white gown, from which there hangs a hood, which serves instead of a hat, a coarse shirt, thick shoes, and very wide breeches. The women are dressed very much like the men, except that they have no breeches. Their common food consists wholly of vegetables; not because it is unlawful to eat any other, but because that kind of abstinence is looked upon as more conformable to the spirit of Christianity, which has an aversion from blood.

Each individual follows with cheerfulness the branch of business allotted him; and the produce of all their labours is deposited in a common stock, for the use of the whole. This union of industry has not only established agriculture, manufactures, and all the arts necessary for the support of this little society; but hath also supplied, for the purposes of exchange, superfluities proportioned to the degree of its population.

Though the two sexes live separate at Euphrates, the Dumplers do not on that account foolishly renounce matrimony; but those who find themselves disposed to it, leave the town, and form an establishment in the country, which is supported at the public expence. They repay this by the produce of their labours, which is all thrown into the public treasury; and their children are sent to be educated in Euphrates, which they consider as their mother-country.—Without this wise privilege, the Dumplers would be no better than monks; and in process of time they would become either savages or libertines. They are at present an innocent, though perhaps deluded, race.

PHILADELPHIA, an ancient town of Turkey in Asia, in Natolia. It is seated at the foot of mount Tmolus, by the river Cogamus, from whence there is an exceeding fine view over an extensive plain. This place was founded by Attalus Philadelphus, brother of Eumenes.

It was very liable to earthquakes, which, perhaps, arose from its vicinity to the region called *Catakekanmene*. So severe were those earthquakes, that even the city walls were not secure; and so frequent were they, that these experienced daily concussions. The inhabitants, therefore, who were not numerous, lived in perpetual apprehension, and their constant employment was in repairs. In fact, so great were their fears, that their chief residence was in the country, the soil of which was very fertile. Such is Strabo's account of this place. In the year 1097, it was taken by assault by John Ducas the Greek general. It was without difficulty reduced also in the year 1106, under the same emperor. The Turks marched from the East with a design to plunder it and the maritime

towns. The Emperor Mamut, in 1175, retired for protection from the Turks to this place. In 1300 it fell by lot to Karaman. In 1306 it was besieged by Alifaras, and considerably harassed; but was not taken. In 1391, this place alone refused to admit Bajazet; but it was at length forced to capitulate for want of provisions. It has been matter of surprise that this town was not totally abandoned; and yet it has survived many cities less liable to inconveniences, and is still an extensive place, tho' in its appearance it is poor and mean. Some remnants of its walls are still standing, but with large gaps. The materials of the wall are small stones strongly cemented. It is thick, lofty, and has round towers. Near this place, between the mountains, there is a spring of a purgative quality; it is much esteemed, and many people resort to it in the hot months. It tastes like ink, is clear, but tinges the earth with the colour of ochre. The famous wall which credulity has ascribed to be made of human bones, stands beyond this and beyond the town. See the next article.

When Dr Chandler was there, he tells us, "The *Travel* in *Greece* bishop of Philadelphia was absent; but the proto-papas or chief-priest, his substitute, whom we went to visit, received us at his palace, a title given to a very indifferent house or rather a cottage of clay. We found him ignorant of the Greek tongue, and were forced to discourse with him by an interpreter in the Turkish language. He had no idea that Philadelphia existed before Christianity, but told us it had become a city in consequence of the many religious foundations. The number of churches he reckoned at 24, mostly in ruins, and mere masses of wall decorated with painted saints. Only six are in a better condition, and have their priests. The episcopal church is large, and ornamented with gilding, carving, and holy portraits. The Greeks are about 300 families, and live in a friendly intercourse with the Turks, of whom they speak well. We were assured that the clergy and laity in general knew as little of Greek as the proto-papas; and yet the liturgies and offices of the church are read as elsewhere, and have undergone no alteration on that account.

"The Philadelphians are a civil people. One of the Greeks sent us a small earthen vessel full of choice wine. Some families beneath the trees, by a rill of water, invited us to alight, and partake of their refreshments. They saluted us when we met; and the aga or governor, on hearing that we were Franks, bade us welcome by a messenger.

"Philadelphia possessing waters excellent in dying, and being situated on one of the most capital roads to Smyrna, is much frequented, especially by Armenian merchants. The Greeks still call this place by its ancient name, but the Turks call it *Allahijur*. The number of inhabitants are about 7000 or 8000; of whom 2000 are supposed to be Christians. It is about 40 miles E. S. E. of Smyrna. E. Long. 28. 15. N. Lat. 38. 28.

PHILADELPHIA-Stones, a name which some authors have given to what is otherwise called *Chrylian bones*, found in the walls of that city. It is a vulgar error that these walls are built of bones; and the tradition of the country is, that when the Turks took the place, they fortified it for themselves, and built their walls

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of the bones of the Christians whom they had killed there. Dr Smyth, in one of his epistles, mentions this wall as an instance of Turkish barbarity. This idle opinion has gained credit merely from a loose and porous stone of the foamy kind, found in an old aqueduct, which is still in the wall. Sir Paul Rycaut brought home pieces of these bones, which even he supposed to have been bones, but they proved on examination to be various bodies, chiefly vegetable, incrustated over and preserved in a spar or the nature of that which forms incrustations in Knareborough spring, and other places with us. These bodies are often cemented together in considerable numbers by this matter, and the true shape lost in the congeries, till a diligent and judicious eye traces them regularly.

PHILADELPHIAN-society, in ecclesiastical history, an obscure and inconsiderable society of mystics. They were formed about the end of the last century by an English female fanatic, whose name was *Jane Leadley*. This woman, seduced by her visions, predictions, and doctrines, several disciples, among whom were persons of learning. She believed that all dissensions among Christians would cease, and the kingdom of the Redeemer become a scene of charity and felicity, if Christians, disregarding the forms of doctrine or discipline of their several communions, would all join in committing their souls to the care of the internal guide, to be instructed, governed, and formed, by his divine impulse and suggestions. But she went farther than this: she even pretended a divine commission to proclaim the approach of this glorious communion of saints; and was convinced that the society established by herself was the true kingdom of Christ. One of her leading doctrines was, that of the final reformation of all intelligent beings to perfection and happiness.

PHILADELPHUS, in antiquity, was a title or surname borne by several ancient kings; formed from the Greek φίλος, "friend, lover," and ἀδελφός, "brother;" *q. d.* one who loves his brother or brethren. See *PTOLEMY* and *EGYPT*.

PHILADELPHUS, the PIPE-TREE, or *Mock orange*; a genus of the monogynia order, belonging to the icofandria class of plants.

Species 1. The coronarius, white syringe, or mock-orange, has been long cultivated in the gardens of this country as a flowering shrub; it is not well known in what country it is to be found native. It rises seven or eight feet high; sending up a great number of slender stalks from the root. These have a grey bark, branch out from their sides, and are garnished with oval spear-shaped leaves. These last have deep indentures on their edges; their upper surface being of a deep green, but the under surface pale, with the taste of a fresh cucumber. The flowers are white, and come out from the sides and at the ends of the branches in loose bunches, each standing on a distal foot-stalk: they have four oval petals, which spread open, with a great number of stamina within, surrounding the style.

This shrub by its flowers makes a fine figure in May and June; for they are produced in clusters both at the end and from the sides of the branches. They are of a fine white colour, and exceedingly fragrant. The petals of which each is composed are large, and spread open like those of the orange; and then form-

ing branches, which stand each on its own separate short foot-stalk, and being produced in plenty all over the shrub, catch at once both the eye and the smell: The eye, by the pleasing appearance it will then have; the smell, as the air at some distance will be replete with the odoriferous particles constantly emitted from those fragrant flowers. These flowers, however, are very improper for chimneys, water-plasses, &c. in rooms; for in those places their scent will be too strong; and for the ladies in particular, often too powerful.

The double-flowering syringa, is a low variety of this species, seldom rising to more than a yard high. The description of the other belongs to this sort, except that the leaves and branches are proportionally smaller and more numerous, and the bark of the shoots of a lighter brown. It is called the *Double-flowering syringa*, because it sometimes produces a flower or two with three or four rows of petals; whereas, in general, the flowers, which are very few, and seldom produced, are single. They are much smaller than those of the other; and you will not see a flower of any kind on this shrub oftener perhaps than once in five years. It is hardly worth propagating on this account; so that a few plants only ought to be admitted into a collection, to be ready for observation.

The dwarf syringa is still of lower growth than the other, seldom arising to more than two feet in height. The description of the first sort still agrees with this; only that the branches and leaves are still proportionally smaller and more numerous, and the bark is still of a lighter brown. It never produces flowers.

2. The nanus, with oval leaves somewhat indented, and double flowers, seldom rises above three feet high; the flowers come out singly from the sides of the branches, and have a double or treble row of petals of the same size and form as well as the same scent with the former; but this sort flowers very rarely, so is but little esteemed.

3. The inodorus, with entire leaves, is a native of Carolina, and as yet but little known in Europe. It rises with a shrubby stalk of about 16 feet in height, sending out slender branches from the sides opposite, garnished with smooth leaves shaped like those of the pear-tree, and standing on pretty long foot-stalks. The flowers are produced at the ends of the branches; and are large, white, spreading open, with a great number of short stamina with yellow summits. This is called the *Carolina syringa*, is the tallest grower by far of any sort of the syringa, and makes the grandest show when in blow; though the flowers are destitute of smell.

The propagation of all the sorts is very easy: They are increased by layers, cuttings, or suckers. 1. The most certain method is by layers; for the young twigs being laid in the earth in the winter, will be good-rooted plants by the autumn following. 2. These plants may be increased by cuttings, which being planted in October, in a shady moist border, many of them will grow; though it will be proper to let those of the Carolina sort remain until spring, and then to plant them in pots, and help them by a little heat in the bed. By this assistance, hardly one cutting will fail. 3. They may be also increased by suckers; for all the sorts throw out suckers, though the Carolina syringa the least of any. These will all strike root,

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and be fit for the nursery ground: nay, the double-flowering and the dwarf sorts are always increased this way; for these plants having stood five or six years, may be taken up and divided into several scores. All the plants, however, whether raised from layers, cuttings, or suckers, should be planted in the nursery-ground to get strength, before they are set out for good. They should be planted a foot asunder, and the distance in the rows should be two feet. After this, they will require no other care than hoeing the weeds, until they have stood about two years, which will be long enough for them to stand there.

PHILANI, were two brothers, citizens of Carthage, who sacrificed their lives for the good of their country. At the time when the Carthaginians ruled over the greatest part of Africa, the Cyrenians were also a great and wealthy people. The country in the middle betwixt them was all sandy, and of an uniform appearance. There was neither river nor mountain to distinguish their limits; a circumstance which engaged them in a terrible and tedious war with one another. After their armies and fleets had been often routed and put to flight on both sides, and they had weakened one another pretty much; and fearing lest, by and by, some third people should fall upon the conquered and conquerors together, equally weakened, upon a cessation of arms they made an agreement, "that upon a day appointed deputies should set out from their respective homes, and the place where they met one another should be accounted the common boundary of both nations." Accordingly, the two brothers called Philani, sent from Carthage, made all dispatch to perform their journey. The Cyrenians proceeded more slowly. These last, perceiving themselves a little behind, and turning apprehensive of punishment at home for mismanaging the affair, charged the Carthaginians with setting out before the time; made a mighty bustle upon it; and, in short, would rather choose any thing than go away outdone. But whereas the Carthaginians desired any other terms, provided only they were fair, the Greeks made this proposal to the Carthaginians, "either to be buried alive in the place which they claimed as the boundary to their nation, or that they would advance forward to what place they inclined upon the same condition." The Philani accepting the offer, made a sacrifice of themselves and their lives to their country, and so were buried alive. The Carthaginians dedicated altars in that place to the memory of the two brothers. These altars, called *Ara Philanorum*, served as a boundary to the empire of the Carthaginians, which extended from this monument to Hercules's Pillars, which is about 2000 miles, or, according to the accurate observations of the moderns, only 1420 geographical miles. It is Sallust who gives this account in his history of the Jugurthine war.

PHILANTHROPY is compounded of two Greek words which signify the love of mankind. It is therefore of nearly the same import with *benevolence* (A); and

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differs from *friendship*, as this latter affection subsists only between a few individuals, whilst *philanthropy* comprehends the whole species.

Whether man has an instinctive propensity to love his species, which makes him incapable of happiness but in the midst of society, and impels him to do all the good that he can to others, feeling their felicity an addition to his own, is a question that has been warmly debated among philosophers ever since metaphysics was studied as a science. With the opinions of the ancients we shall not, in this detached article, trouble our readers; but it would be unpardonable to pass without notice the different theories which on so interesting a subject have divided the moderns.

Hobbes, who believed, or pretended to believe, that right results from power, and that in society there is no other standard of justice than the law of the land, or the will of the supreme magistrate, built his opinions upon a theory of human nature in which philanthropy has no place. According to him, mankind, in the original state of nature, were wholly *selfish*. Each endeavoured to seize, by fraud or force, whatever he thought would contribute to his comfort; and as all had nearly the same wants, the inevitable consequence of this selfishness was universal war. We are taught indeed by the same philosopher, that, in a series of ages, mankind discovered the miseries of this state of nature; and therefore, upon the same basis of universal selfishness, formed societies, over which they placed supreme governors for the purpose of protecting the weak against the violence of the strong. He does not, however, explain how men, whose angry and selfish passions were thus excited to the utmost against each other, could enter upon this friendly treaty; or, supposing it formed, how the ignorant multitude were induced to pay obedience to the more enlightened few. Clogged with this and other insurmountable difficulties, his philosophy of human nature soon fell into merited contempt; but about the *origin* of philanthropy those who united in opposition to him still thought very differently from one another.

The elegant *Shaftesbury*, who had imbibed much of the spirit of Plato, endeavoured, like his master, to deduce all the duties of man, and almost all his actions, from a number of internal feelings or instincts which he supposed to be interwoven with his constitution by the immediate hand of God. This system appeared so honourable to human nature, and at the same time was so easily comprehended, that the noble lord had soon many followers, and may indeed be considered as the founder of a school which has produced philosophers whose works do honour to the age and country in which they flourished. Among these we must reckon *Bishop Butler*, *Hutchison*, *Lord Kames*, *Dr Beattie*, and perhaps *Dr Reid*.

According to the system of these writers, the whole duty of man results from an intuitive principle, to which they have given the name of the moral sense; and with this sense they conceive philanthropy to be inseparably

(A) We say *nearly* of the same import; because *benevolence* extends to every being that has life and sense, and is of course susceptible of pain and pleasure; whereas *philanthropy* cannot comprehend more than the human race.

inseparably united, or rather perhaps to make an essential part of it. (See MORAL PHILOSOPHY.) If this theory be carried to its utmost extent, as it has been by some of its patrons, it seems to follow, that peace and harmony should reign among savages; and that a man who had from his infancy grown up in solitude, would be delighted with the first sight of a fellow-creature, and run to him with eagerness as to a new source of enjoyment. This conclusion, however, is contrary to acknowledged facts. Savages are generally divided into small tribes or hordes; and though the attachment of individuals to their own tribe appears indeed to be abundantly strong, the tribes themselves are frequently at war, and entertain a constant jealousy of each other. Savages, too, are almost universally afraid of strangers; and the few solitary individuals, who have been caught in parts where they had run wild from their infancy, instead of being delighted with the appearance of fellow-men, have either fled from them with their utmost speed, or been fixed to the spot in terror and astonishment. There are no indications of that instinctive philanthropy for which some writers so strenuously plead. They have indeed induced others to deny, that in human nature there is any instinctive principles at all; and to endeavour to account for our several propensities by the influence of education producing early and deep-rooted habits.

At the head of this school stood Locke and Hartley. The former, employing himself almost wholly on the intellectual powers of man, and combating the absurd, though then generally received, belief, that there are in the human mind innate principles of speculative truth, has touched but incidentally on our principles of action. It seems, however, to be evident, that he did not consider any *one* of these principles as innate; and his opinion was adopted by Hartley, who studied the sensitive part of human nature with greater industry and success than perhaps any writer who had preceded him in that department of science. This philosopher refuses all kinds of instinct to man, even the *instinct* of a mother to her new-born infant, and that which has been generally supposed innate—the propensity of the infant to suck the breast. It is therefore needless to say that in his theory of human nature innate philanthropy can have no place.

The reader, however, must not suppose that the theory of Hartley is the theory of Hobbes. Though he admits no *innate* principles of action in the human mind, he is far from dreaming that the original state of man was a state of war and selfishness, or that the acquisition of philanthropic sentiments is not natural. He considers such acquisitions as even necessary and unavoidable, and founds them on the great law of association, which we have elsewhere endeavoured to explain (See METAPHYSICS, Part I. chap. v.) Hartley was a Christian, and appears to have been a man of great piety. Conceiving with Locke that men are born without any ideas, or any principles either of knowledge or of action, but that they are subject to the law of association as much as to the impressions of sense, he seems to have thought, that the important purpose for which they are sent into this world is, that they may acquire habits of piety and virtue, which, operating like instincts, will fit them for the puer society of a future state. That this theory is un-

friendly to morals, no man who understands it will presume to affirm. It appears, indeed, to be more consistent with the necessity of a revelation from God than that of Shaftesbury, which has so many followers: but notwithstanding this, we cannot help thinking that the excellent author has carried his antipathy to instincts by much too far (see INSTRUCTOR), and that the truth lies in the middle between him and his opponents.

Without some instincts to influence before the dawn of reason, it is not easy to be conceived how children could be induced to that exercise which is absolutely necessary to life and health; nor does it appear with sufficient evidence that the human race are deserted by every instinct as soon as their rational powers are evolved. It seems to be a matter of fact which cannot be controverted, that women have an instinctive attachment to their new-born infants; but that these, when they become capable of distinguishing objects, are *instinctively* attached to their parents, their brothers, and sisters, is a position which, though it may be true, seems incapable of proof. That they soon appear to be so attached, is a fact which we believe no man will deny: but the attachment may be accounted for by the associating principle operating upon that desire of happiness which is necessarily formed as soon as happiness is experienced. (See PASSION.) An infant becomes earlier attached to its nurse than to any other person; because, feeling wants which she supplies, the idea of enjoyment becomes soon associated in its mind with the perception of the woman. If this woman be its mother, a hasty observer immediately attributes this attachment to instinct directing the infant to love its parent; but that instinct has here no place, is evident from the well-known facts, that a child is as fond of a tender nurse, though no relation, as of the most affectionate mother; and as regardless of a mother who seldom sees it, or sees it with indifference, as of any other person. Nay, we have seen children of the sweetest dispositions as fond of the maid with whom they slept, as of a very affectionate parent by whom they had been tenderly nursed: and sure no man will say that this could be instinct; it was evidently a new association of the idea of the maid with the greatest happiness which they enjoyed after the period of their suckling was at an end.

It is much in the same way that children acquire an attachment to their brothers and sisters. Brothers and sisters being constantly together, contribute to each other's amusement: hence arises that pleasure which they have in each other's company, and the uneasiness which they feel when separated. This generates mutual love in their minds, which is strengthened by the perpetual injunctions of their parents; for if these have any virtue themselves, they cannot fail to inculcate the duty of loving each other on their tender offspring. Benevolence, thus generated, soon extends to their duly companions; and takes a wider and a wider range as these companions are multiplied, and as children advance towards the state of manhood. New objects then present themselves to the mind. A man soon discovers, that, as he is a member of a community, his happiness as an individual depends in a great measure on the prosperity of the whole. Hence arises *genuineness*, and that pleasure which we all take in

Philemon.
Philemon.

in the eminence of our countrymen. But the principle of benevolence stops not here. He whose mind is enlarged by a liberal education, considers all particular countries as provinces of one great country extended over the whole globe; and all mankind, of course, as not only sharing the same nature with himself, but as being in reality his fellow-citizens and brethren. The principles of religion, if he be actuated by them, must aid these reflexions, and make him with the happiness of all who stand in the same relation with himself to the Great Governor of the world. This is *philanthropy*; and we see how it may spring, by the great law of association, from desires which, in their original state, cannot be considered as other than selfish. It is a calm sentiment, which we believe hardly ever rises to the warmth of affection, and certainly not to the heat of passion.

Should any of our readers be disposed to controvert this opinion, or to fancy it degrading to human nature, we will not enter into controversy with them; we only beg leave to ask, whether they have ever rejoiced in the good fortune of a stranger or a foreigner, or regretted his loss, with any portion of those feelings which they have frequently experienced on hearing of the prosperity or the death of a friend or a neighbour? We answer candidly for ourselves, that we feel no interest which can be called *passion* or *affection* in the fortunes of a native of China; and yet we should be sorry to think that our philanthropy is less than that of other men. A common clown, we are inclined to believe, seldom extends his affection beyond his friends and neighbours; and though, from having often heard his country praised, and knowing that he belongs to that country, he would probably be offended at the man who should prefer another to it; yet if no misfortune befall himself, or his friends and neighbours, we imagine that his grief for public calamities may be borne with patience. In his mind no such associations have been formed as comprise the good of a country, far less of all countries; and therefore his philanthropy must be confined to a very limited range. We doubt not, however, but that as opportunity offers, and as circumstances permit, such a man is ready to feed the hungry and clothe the naked of all countries; not indeed from sentiments of affection either innate or acquired, but from the obvious reflection that he is not exempted from those calamities which have befallen them, and from a still higher principle—a sense of duty to that God who has made of one blood all nations upon earth, and commanded them to be mutually aiding to each other.

PHILEMON, a Greek comic poet, was son to Damon, and contemporary with Menander. Any advantage he had over this poet, was owing less to his own merit than to the intrigues of his friends. Plautus has imitated his comedy *du Marchand*. He is reported to have died laughing on seeing his ass eat figs. He was then about 97 years of age. His son, Philemon the younger, was also the author of 54 comedies, of which there are still extant some considerable fragments collected by Grotius. These clearly prove that he was not a poet of the first rank. He flourished about the year 274 before our Saviour.

PHILEMON, was a rich citizen of Colossæ in Phrygia.

He was converted to the Christian faith, with Appia his wife by Epaphras the disciple of St Paul; for St Paul himself did not preach at Colossæ, Coloss. iii. 1. Perhaps we should have known nothing of S. Philemon, had it not been on the account of his slave Onesimus, who having robbed him, and run away from him, came to Rome, where he found St Paul, and was very serviceable to him. St Paul converted him, baptized him, and sent him back to his master Philemon; to whom he wrote a letter still extant, and which passes for a masterpiece of that kind of eloquence, natural, lively, strong, and pathetic, that was peculiar to St Paul. Philemon (1. 2) had made a church of his house, and all his domestics, as well as himself, were of the household of faith. His charity, liberality, and compassion, were a sure refuge to all that were in distress. The Apostolical Constitutions say, that St Paul made him bishop of Colossæ; but the Menæa insinuate, that he went to Gaza in Palestine, of which he was the apostle and first bishop. From thence he returned to Colossæ, where he suffered martyrdom with Appia his wife, in the time of Nero. They relate several particulars of his martyrdom, and say, that his body remained at Colossæ, where it performed several miracles.

PHILETAS, a Greek poet and grammarian, of the island of Cos, flourished under Philip and Alexander the Great, and was preceptor of Ptolemy Philadelphus. He was the author of some Elegies, Epigrams, and other works, which have not come down to us. He is celebrated in the poems of Ovid and Propertius, as one of the best poets of his age. Elian reports a very improbable story of him, namely, 'that his body was so slender and feeble, that he was obliged to have some lead in his pockets, to prevent him from being carried away by the wind.'

PHILETUS. St Paul, writing to Timothy (2 Tim. ii. 16, 17, 18.) in the 65th year of Christ, and a little while before his own martyrdom, speaks thus: "But shun profane and vain babblings, for they will increase unto more ungodliness. And their word will eat as doth a canker; of whom is Hymenæus and Philetus; who concerning the truth have erred, saying, that the resurrection is past already, and overthrow the faith of some." We have nothing very certain concerning Philetus; for we make but small account of what is read in the false Abdias, in the life of St James major, even supposing this author had not put the name of Philetus instead of Phygellus. This is the substance of what is found in Abdias. St James the son of Zebedee, passing through the synagogues of Judea and Samaria, preached everywhere the faith of Jesus Christ. Hermogenes and Philetus strenuously opposed him, affirming, that Jesus Christ was not the Messiah. Hermogenes was a notable magician, and Philetus was his disciple, who being converted, was desirous to bring his master to St James; but Hermogenes bound him up so by his magic art, that he could not come at the apostle. Philetus found means to make St James acquainted with what had happened to him; upon which St James unbound him, and Philetus came to him. Hermogenes perceiving how ineffectual his art was against the saint, became himself a convert as well as Philetus.

PHILIBEG, is a little plaid, called also *kilt*, and

Philetas
Philibeg

is a sort of short petticoat reaching nearly to the knees, worn by the Scotch Highlanders. It is a modern substitute for the lower part of the plaid, being found to be less cumbersome, especially in time of action, when the Highlanders used to tuck their breechdan into their girdle. Almost all of them have a great pouch of bagg and other skins, with tassels dangling before, in which they keep their tobacco and money.

PHILIP, foster-brother of Antiochus Epiphanes (1 Macc. vi. 14, & 55. 2 Macc. ix. 24), was a Phrygian by birth, and very much in Antiochus's favour. This prince made him governor of Jerusalem (2 Macc. viii. 5. x. 22.) where he committed many outrages upon the Jews, to force them to forsake their religion. Seeing that Apollonius and Seron were defeated by Judas Maccabæus, he sent for new lieutenants to Ptolemy governor of Cœlo-Syria, who sent him Gorgias and Nicænor with a powerful army. Some time after, Antiochus going beyond the Euphrates, to extort money from the people, Philip went along with him; and Antiochus finding himself near his end (1 Macc. vi. 14.) made him regent of the kingdom, put his diadem into his hands, his royal cloak, and his ring, that he might render them to his son the young Antiochus Eupator. But Lyfias having taken possession of the government in the name of young Eupator, who was but a child, Philip not being able to cope with him, durst not return into Syria; but he went into Egypt, carrying the body of Epiphanes along with him, there to implore assistance from Ptolemy Philometor against Lyfias the usurper of the government of Syria. The year following, while Lyfias was busy in the war carrying on against the Jews, Philip got into Syria, and took possession of Antioch: but Lyfias returning into the country, with great diligence, retook Antioch, and put Philip to death, who was taken in the city.

PHILIP the apostle was a native of Bethsaida in Galilee. Jesus Christ having seen him, said to him, "Follow me," John i. 43, 44, &c. Philip followed him; and soon after finding Nathanael, Philip said to him, "We have found the Messiah, of whom Moses and the prophets have spoken, Jesus of Nazareth, the son of Joseph." Nathanael asked him, "Can any thing good come out of Nazareth? To which Philip replied, "Come and see." Then he brought Nathanael to Jesus, and they went with him to the marriage of Cana in Galilee. St Philip was called at the very beginning of our Saviour's mission; and when Jesus Christ was about to feed the 5000 that followed him (Luke vi. 13. Mat. x. 2. John vi. 5—7.), he asked St Philip, only to prove him, whence bread might be bought for such a multitude of people? Philip answered, that 200 penny-worth of bread would not be sufficient for every one to taste a little. Some Gentiles, having a curiosity to see Jesus Christ, a little before his passion, they addressed themselves to St Philip (John xii. 21, 22.), who mentioned it to St Andrew, and these two to Christ. At the last supper, Philip desired our Saviour, that he would be pleased to show them the Father, being all that they desired (John xiv. 8—10.) But Jesus told them, that seeing the Son they saw the Father also. This is all we find concerning Philip in the gospel.

The upper Asia fell to this apostle's lot, where he

took great pains in planting the gospel, and by his preaching and miracles made many converts. In the latter part of his life, he came to Hierapolis in Phrygia, a city very much addicted to idolatry, and particularly to the worship of a serpent of a prodigious bigness. St Philip by his prayers procured the death, or at least the disappearing, of this monster, and convinced its worshippers of the absurdity of paying divine honours to such odious creatures. But the magistrates, enraged at Philip's success, imprisoned him, and ordered him to be severely scourged, and then put to death, which some say was by crucifixion; others, by hanging him up against a pillar. St Philip is generally reckoned among the married apostles; and it is said he had three daughters, two whereof preserved their virginity, and died at Hierapolis; the third, having led a very spiritual life, died at Ephesus. He left behind him no writings. The gospel under his name was forged by the Gnostics, to countenance their bad principles and worse practices. The Christian church observes the festival of this saint, together with that of St James, on the first day of May. Euseb. lib. iii. c. 30.

PHILIP, the second of the seven deacons, was chosen by the apostles after our Saviour's resurrection. (Acts vi. 5.) This deacon, they say, was of Cæsarea in Palestine. It is certain that his daughters lived in this city (Acts xxi. 8, 9.) After the death of St Stephen, all the Christians, excepting the apostles, having left Jerusalem, and being dispersed in several places, St Philip went to preach at Samaria (*id.* viii. 1, 2, &c.), where he performed several miracles, and converted many persons. He baptised them; but being only a deacon, he could not confer on them the Holy Ghost. Wherefore having made known to the apostles at Jerusalem, that Samaria had received the word of God, Peter and John came thither, and the Samaritans that were converted received the Holy Ghost. St Philip was probably at Samaria when the angel of the Lord ordered him to go to the south part of the country, in the road that leads from Jerusalem to old Gaza. Philip obeyed, and there met with an Ethiopian eunuch belonging to Queen Candace, who had the care of her revenues, and had been at Jerusalem to worship God there (*id.* viii. 26, 27, &c.) He was then returning into his own country, and was reading the prophet Isaiah as he went along in his chariot. Philip, hearing the eunuch reading the prophet Isaiah, said to him, Do you understand what you read? The eunuch replied, How should I understand, except somebody explain it to me? He desired Philip therefore to come and sit down by him in the chariot. The passage the eunuch was reading is this, "He was led as a sheep to the slaughter, and like a lamb dumb before his shearer, so he opened not his mouth." The eunuch then says to Philip, Pray, whom does the prophet speak of in this place? Is it of himself, or of some other? Then Philip began to instruct him concerning Jesus Christ. And having gone on together, they came to a fountain; when the eunuch said to Philip, Here is water, what hinders me from being baptized? Philip told him that he might be so, if he believed with all his heart. He replied, I believe that Jesus Christ is the son of God. He then ordered the chariot to stop, and they both alighted and went down into the wa-

Philip.

ter, where Philip baptized the eunuch. Being come out of the water, the Spirit of the Lord took away Philip, and the eunuch saw no more of him. But Philip was found again at Azotus, and he preached the gospel in all the cities he passed through, till he arrived at Cæsarea in Palestine. After this, the scripture does not inform us of any particulars relating to Philip. The modern Greeks say that he went to Tralles in Asia, where he founded a church, of which he was the apostle and bishop; and where he rested in peace, after performing many miracles. The Latins, on the contrary, say that he died at Cæsarea, and that three of his daughters were there buried with him.

It is thought, that the eunuch converted by St Philip was the first apostle of the Ethiopians; and that the Abyssines boast of having received the Christian faith from him.

Philip II. was the 4th son of Amyntas, king of Macedonia. He was sent to Thebes as an hostage by his father, where he learnt the art of war under Epaminondas, and studied with the greatest care the manners and the pursuits of the Greeks. He discovered, from his earliest years, that quickness of genius and greatness of courage which afterwards procured him so great a name and such powerful enemies. He was recalled to Macedonia; and at the death of his brother Perdiccas he ascended the throne as guardian and protector of the youthful years of his nephew. His ambition, however, soon discovered itself, and he made himself independent about the year 360 before Christ. The valour of a prudent general, and the policy of an experienced statesman, seemed requisite to ensure his power. The neighbouring nations, ridiculing the youth and inexperience of the new king of Macedonia, appeared in arms; but Philip soon convinced them of their error. Unable to meet them as yet in the field of battle, he suspended their fury by presents, and soon turned his arms against Amphipolis, a colony tributary to the Athenians. Amphipolis was conquered, and added to the kingdom of Macedonia; and Philip meditated no less than the destruction of a republic which had rendered itself so formidable to the rest of Greece, and had even claimed submission from the princes of Macedonia. His designs, however, were as yet immature; and before he could make Athens an object of conquest, the Thracians and the Illyrians demanded his attention. He made himself master of a Thracian colony, to which he gave the name of *Philippi*, and from which he received the greatest advantages on account of the golden mines in the neighbourhood. These made it a very important capture. He settled in it a number of workmen, and was the first who caused gold to be coined in his own name. He employed his wealth in procuring spies and partisans in all the great cities of Greece, and in making conquests without the aid of arms. It was at the siege of Methone in Thrace that Philip had the misfortune to receive a wound in his right eye from the stroke of an arrow. In the midst of his political prosperity, Philip did not neglect the honour of his family. He married Olympias the daughter of Neoptolemus, king of the Molossi; and when, some time after, he became father of Alexander, the monarch, conscious of the inestimable advantages which arise from the lessons, the example, and conversation

of a learned and virtuous preceptor, wrote a letter with his own hand to the philosopher Aristotle, and begged him to retire from his usual pursuits, and to dedicate his whole time to the instruction of the young prince. Every thing seemed now to conspire to his aggrandizement; and historians have observed that Philip received in one day the intelligence of three things which could gratify the most unbounded ambition, and flatter the hopes of the most aspiring monarch: the birth of a son, an honourable crown at the Olympic games, and a victory over the barbarians of Illyricum. But all these increased rather than satiated his ambition: he declared his inimical sentiments against the power of Athens, and the independence of all Greece, by laying siege to Olynthus, a place which, on account of its situation and consequence, would prove most injurious to the interests of the Athenians, and most advantageous to the intrigues and military operations of every Macedonian prince. The Athenians, roused by the eloquence of Demosthenes, sent 17 vessels and 2000 men to the assistance of Olynthus; but the money of Philip prevailed over all their efforts. The greatest part of the citizens suffered themselves to be bribed by the Macedonian gold, and Olynthus surrendered to the enemy, and was instantly reduced to ruins. Philip soon after defeated the Athenians, and made a great number of them prisoners, whom he dismissed without ransom. Of this victory, the fruit of that excellent discipline which he had established in his army, the Macedonian phalanx had the principal honour. This was a body of infantry heavily armed, consisting commonly of 16,000 men, who had each of them a shield six feet high and a pike 21 feet long. (See PHALANX). The success of his arms, and especially his generosity after victory, made his alliance and a peace a desirable object to the people of Athens; and as both parties were inclined to this measure, it was concluded without delay. His successes were as great in every part of Greece: he was declared head of the Amphictyonic council, and was entrusted with the care of the sacred temple of Apollo at Delphi. If he was recalled to Macedonia, it was only to add fresh laurels to his crown, by victories over his enemies in Illyricum and Thessaly. By assuming the mask of a moderator and peace-maker, he gained confidence; and in attempting to protect the Peloponnesians against the incroaching power of Sparta, he rendered his cause popular; and by ridiculing the insults that were offered to his person as he passed through Corinth, he displayed to the world his moderation and philosophic virtues. In his attempts to make himself master of Eubœa, Philip was unsuccessful; and Phocion, who despised his gold as well as his meanness, obliged him to evacuate an island whose inhabitants were as insensible to the charms of money as they were unmoved at the horrors of war, and the bold efforts of a vigilant enemy. From Eubœa he turned his arms against the Scythians; but the advantages he obtained over this indigent nation were inconsiderable, and he again made Greece an object of plunder and rapine. He advanced far in Bœotia, and a general engagement was fought at Chæronea. The fight was long and bloody, but Philip obtained the victory. His behaviour after the battle reflects great disgrace upon him as a man and as a monarch. In the hour of festivity,

Philip.

Philip. ty, and during the entertainment which he had given to celebrate the trophies he had won, Philip sallied from his camp, and with the inhumanity of a brute, he insulted the bodies of the slain, and exulted over the calamities of the prisoners of war. His insolence, however, was checked, when Demades, one of the Athenian captives, reminded him of his meanness, by exclaiming, "Why do you, O king, act the part of a Thersites, when you can represent with so much dignity the elevated character of an Agamemnon?" The reproof was felt; Demades received his liberty; and Philip learned how to gain popularity even among his fallen enemies, by relieving their wants and easing their distresses. At the battle of Chæronæa the independence of Greece was extinguished; and Philip, unable to find new enemies in Europe, formed new enterprises, and meditated new conquests. He was nominated general of the Greeks against the Persians, and was called upon as well from inclination as duty to revenge those injuries which Greece had suffered from the invasions of Darius and of Xerxes. But he was stopped in the midst of his warlike preparations, being stabbed by Pausanias as he entered the theatre at the celebration of the nuptials of his daughter Cleopatra. This murder has given rise to many reflections upon the causes which produced it; and many who consider the recent repudiation of Olympias and the resentment of Alexander, are apt to investigate the causes of his death in the bosom of his family. The ridiculous honours which Olympias paid to her husband's murderer strengthened the suspicion; yet Alexander declared that he invaded the kingdom of Persia to revenge his father's death upon the Persian satraps and princes, by whose immediate intrigues the assassination had been committed. The character of Philip is that of a sagacious, artful, prudent, and intriguing monarch: he was brave in the field of battle, eloquent and dissimulating at home, and he possessed the wonderful art of changing his conduct according to the disposition and caprice of mankind, without ever altering his purpose, or losing sight of his ambitious aims. He possessed much perseverance, and in the execution of his plans he was always vigorous. He had that eloquence which is inspired by strong passions. The hand of an assassin prevented him from achieving the boldest and the most extensive of his undertakings; and he might have acquired as many laurels, and conquered as many nations, as his son Alexander did in the succeeding reign; and the kingdom of Persia might have been added to the Macedonian empire, perhaps with greater moderation, with more glory, and with more lasting advantages. The private character of Philip lies open to censure, and raises indignation. The admirer of his virtues is disgusted to find him among the most abandoned prostitutes, and disgracing himself by the most unnatural crimes and lascivious indulgencies which can make even the most debauched and the most profligate to blush. He was murdered in the 47th year of his age, and the 24th of his reign, about 336 years before the Christian era. His reign is become uncommonly interesting, and his administration a matter of instruction. He is the first monarch whose life and actions are described with peculiar accuracy and historical faithfulness. Philip was the father of Alexander the Great and of Cleopatra, by Olympias; he had also by Audaca an Illyrian, Cyna, who married

Amyntas the son of Perdicaas, Philip's elder brother; by Nicaspolis a Thessalian, Nicæa, who married Cassander; by Philina a Larissian daughter, Arrhenus, who reigned some time after Alexander's death; by Cleopatra, the niece of Attalus, Caranus and Europa, who were both murdered by Olympias; and Proterus, the first king of Egypt, by Arsinoë, who in the first month of her pregnancy was married to Lagos. Of the many memorable actions and sayings reported by Plutarch of this prince, the following are the most remarkable. Being present at the sale of some captives, in an indecent posture, one of them informed him of it: "Set this man at liberty (says Philip), I did not know that he was my friend." Being solicited to favour a lord of his court, who was like to lose his character by a just but severe sentence, Philip refused to hearken to the solicitation, and added, "I had rather that he be disgraced than myself." A poor woman was importuning him to do her justice; and as he sent her away from day to day, under the pretence that he had no time to attend to her petition, she said to him with some warmth, "Cease then to be a king." Philip felt all the force of this reproof, and immediately gave her satisfaction.—Another woman came to ask justice of him as he was going out from a great entertainment, and was condemned. "I appeal (exclaimed she)!" "And to whom do you appeal (said the king to her)?" "To Philip fasting." This answer opened the eyes of the monarch, who retracted his sentence. If he possessed any virtue, it was principally that of suffering injuries with patience. Democharus, to whom the Greeks gave the surname of *Parrhesiastes*, on account of his excessive petulance of tongue, was one of the deputies whom the Athenians sent to this monarch. Philip, at the conclusion of the audience, begged the ambassadors to tell him, "if he could be of any service to the Athenians;" to which Democharus gave an insolent return, which he forgave. Having learned that some Athenian ambassadors charged him, in full assembly, with atrocious calumnies: "I am under great obligation (said he) to those gentlemen, for I shall henceforward be so circumspect in my words and actions, that I shall convict them of falsehood." One saying of Philip, which does him less honour than those we have before mentioned, was, "Let us amuse children with playthings, and men with oaths." This abominable maxim, which was the soul and spring of his politics, gave rise to the observation, "That he was in truth length, what Louis XI. afterwards was in miniature." It is well known that Philip had a person about him, who called out at times, "Philip, remember that thou art mortal;" but whether we should place this to the account of his pride or his humility, it is difficult to say.

Philip V. was king of Macedonia, and son of Demetrius. His infancy, at the death of his father, was protected by Antigonus, one of his friends, who ascended the throne, and reigned for 12 years, with the title of *Independent monarch*. When Antigonus died, Philip recovered his father's throne, though only 15 years of age, and he early distinguished himself by his boldness and his ambitious views. He came to the throne in the year 220 before our Saviour, and the beginning of his reign was rendered glorious by the conquests of Aratus; a general who was as eminent for his love of justice as his skill in war. But so virtuous

Philip a character could hardly fail to be disagreeable to a nation who wanted to include himself in every species of civilization and virtue and indeed in enmity to him accordingly his character in its true light; for to the possession of every virtue, and every extravagant property, he had the weakness to sacrifice the useful and virtuous Athenian. Not satisfied with the kingdom of Macedonia, Philip striven to become the rival of Annibal, and wished to force with him the spoils which the distresses and continual loss of the Romans forced him to procure. But his expectations were frustrated; the Romans discovered his intrigues; and then, weakened by the valor and artifice of the Carthaginian, yet they were soon enabled to meet him in the field of battle. The consul Lævinus entered without delay his territories of Macedonia; and after he had obtained a victory over him near Apollonia, and reduced his fleet to ashes, he compelled him to sue for peace. This peaceful disposition was not permanent; and when the Romans discovered that he had assisted their formidable enemy Annibal with men and money, they appointed T. Q. Flaminius to punish his perfidy, and the violation of the treaty. The Roman consul, with his usual expedition, invaded Macedonia; and in a general engagement, which was fought near Cynocéphale, the hostile army was totally defeated, and the monarch saved his life with difficulty by flying from the field of battle. Destitute of resources, without friends either at home or abroad, Philip was obliged to submit to the mercy of the conqueror, and to demand peace by his ambassadors. It was granted with difficulty; the terms were humiliating; but the poverty of Philip obliged him to accept the conditions, however disadvantageous and degrading to his dignity. In the midst of these public calamities, the peace of his family was disturbed; and Perseus, the eldest of his sons by a concubine, raised seditions against his brother Demetrius, whose condescension and humanity had gained popularity among the Macedonians, and who from his residence at Rome, as an hostage, had gained the good graces of the senate, and by the modesty and innocence of his manners had obtained forgiveness from that venerable body for the hostilities of his father. Philip listened with too much avidity to the false accusations of Perseus; and when he heard it asserted that Demetrius wished to rob him of his crown, he no longer hesitated to punish with death so unworthy and so ungrateful a son. No sooner was Demetrius sacrificed to credulity, than Philip became convinced of his cruelty and rashness; and to punish the perfidy of Perseus, he attempted to make Antigonus, another son, his successor on the Macedonian throne. But he was prevented from executing his purpose by death, in the 42d year of his reign, 178 years before the Christian era. The assassin of Demetrius succeeded his father, and with the same ambition, with the same rashness and oppression, renewed the war against the Romans, till his empire was destroyed, and Macedonia became a Roman province. Philip has been compared with his great ancestor of the same name; but though they possessed the same virtues, the same ambition, and were tainted with the same vices, yet the father of Alexander was more sagacious and more intriguing, and the son of Demetrius was more suspicious, more cruel, and more implacable; and, according to the

pretended prophecy of one of the Sybille, Macedonia was indebted to one Philip for her rise and consequence among nations, and under another Philip she lamented the loss of her power, her empire, and her dignity.

PHILIP (M. Julius), a Roman emperor, of an obscure family in Arabia, from whence he was surnamed *Arabian*. From the lowest rank in the army he gradually rose to the highest offices; and when he was made general of the pretorian guards, he assassinated Gordian, to make himself emperor. To secure himself on the imperial throne, he left Mesopotamia a prey to the continual invasions of the Persians, and hurried to Rome, where his election was universally approved by the senate and the Roman people. Philip rendered his cause popular by his liberality and profusion; and it added much to his splendor and dignity, that the Romans during his reign commemorated the foundation of their city; a solemnity which was observed but once every 100 years, and which was celebrated with more pomp and more magnificence than under the preceding reigns. The people were entertained with games and spectacles; the theatre of Pompey was successively crowded during three days and three nights; and 2000 gladiators bled in the circus at once, for the amusement and pleasure of a gazing populace. His usurpation, however, was short. Philip was defeated by Decius, who had proclaimed himself emperor in Pannonia; and he was assassinated by his own soldiers near Verona, in the 45th year of his age, and the 5th of his reign. His son, who bore the same name, and who had shared with him the imperial dignity, was also massacred in the arms of his mother. Young Philip was then in the 12th year of his age, and the Romans lamented in him the loss of rising talents, of natural humanity, and endearing virtues.

PHILIP, a native of Acarnania, physician to Alexander the Great. When that monarch had been suddenly taken ill, after bathing in the Cydnus, Philip undertook to remove the complaint, when the rest of the physicians believed that all medical assistance would be ineffectual. But as he was preparing his medicine, Alexander received a letter from Parmenio, in which he was advised to beware of his physician Philip, as he had conspired against his life. The monarch was alarmed; and when Philip presented him the medicine, he gave him Parmenio's letter to peruse, and began to drink the potion. The serenity and composure of Philip's countenance, as he read the letter, removed every suspicion from Alexander's breast, and he pursued the directions of his physician, and in a few days recovered.

There were, besides, a vast number of persons of this name in antiquity, and many of them were very eminent.

PHILIP I. king of France, succeeded his father Henry I. in 1060, when but eight years of age, under the regency and guardianship of Baudouin V. count of Flanders, who discharged his trust with zeal and fidelity. He defeated the Gascons who were inclined to revolt, and died, leaving his pupil 15 years of age. This young prince made war in Flanders against Robert, Baudouin's younger son, who had invaded Flanders, which belonged to the children of his el-

Philip. der brother. Philip marched against him with a numerous army, which was cut to pieces near Mount Cassel. Peace was the consequence of the victory, and the conqueror quietly enjoyed his usurpation. Philip, after the fatigues of the war, by way of relaxation gave himself up entirely to pleasure and dissipation. Tired of his wife Bertrada, and fond of Bertrade, spouse of Louis, ex-count of Anjou, he carried her off from her husband. Having, in 1103, legally annulled his own marriage, under the pretext of barrenness, and Bertrade's marriage with the count of Anjou having been set aside under the same pretext, Philip and she were afterwards solemnly married by the bishop of Beauvais. This union was declared void by Pope Urban II. a Frenchman by birth, who pronounced the sentence in the king's own dominions, to which he had come for an asylum. Philip, fearing that the anathemas of the Roman pontiff might be the means of exciting his subjects to rebellion, sent deputies to the pope, who obtained a delay, during which time he was permitted to use the crown. To know what is meant by this permission, it is necessary to recollect, that at that period kings appeared on public solemnities in royal habit, with the crown on their heads, which they received from the hand of a bishop. This delay was not of long duration. Philip was excommunicated anew in a council held at Poitiers in 1100; but in the year 1104, Lambert bishop of Arras, legate of Pope Paschal II. at last brought him his absolution to Paris, after having made him promise never to see Bertrade more; a promise which he did not keep. It would appear that the pope afterwards approved their marriage; for Suger informs us, that their sons were declared capable of succeeding to the crown. Philip died at Melun the 29th of July 1108, aged 57 years, after having witnessed the first crusade, in which he deemed taking any part. His reign, which comprehends a period of 48 years, was the longest of any of his predecessors, excepting that of Clotarius, and of all who came after him except those of Louis XIV. and Louis XV. It was distinguished by several great events: but Philip, though brave in battle, and wise in counsels, was no very excellent character. He appeared so much the more contemptible to his subjects, as that age abounded with heroes. Philip is not the first of the French monarchs (as is commonly reported), who, in order to give the greater authority to his charters, caused them to be subscribed by the officers of the crown; for Henry I. had sometimes done the same before him.

PHILIP II. surnamed *Augustus*, the *conqueror* and *given of God*, son of Louis VII. (called the *younger*). King of France, and of Alix, his third wife, daughter of Thibault, count of Champagne, was born the 22d of August 1165. He came to the crown, after his father's death in 1180, at the age of 15 years. His youth was not spent like that of the generality of other princes; for, by avoiding the rock of pleasure on which so many are apt to split, his courage thereby became the more lively and intrepid. The king of England seemed willing to take advantage of his minority, and to seize upon a part of his dominions. But Philip marched against him, and compelled him, sword in hand, to confirm the ancient treaties between the two kingdoms. As soon as the

war was ended, he made his people enjoy the blessings of peace. He gave a check to the oppressions of the great lords, banished the comedians, punished blasphemies, caused the streets and public places of Paris to be paved, and annexed to that capital a part of the adjacent villages. It was inclosed by walls with towers; and the inhabitants of other cities were equally proud to fortify and embellish theirs. The Jews having for a long time practised the most detestable frauds in France, Philip expelled them from his kingdom, and declared his subjects quit with them; an action unjust, contrary to the laws of nature, and consequently to religion. The tranquillity of France was sometimes disturbed by a difference with the count of Flanders, which was however happily terminated in 1184. Some time after he declared war against Henry II. king of England, and took from him the towns of Moudun, Tours, Mans and other places. The epidemical madness of the crusades then agitated all Europe; and Philip, as well as other princes, caught the infection. He embarked in the year 1191, with Richard I. king of England, for the relief of the Christians in Palestine who were oppressed by Saladin. Those two monarchs sat down before Acre, which is the ancient Ptolemais; as did almost all the Christians of the east, while Saladin was engaged in a civil war on the banks of the Euphrates. When the two European monarchs had joined their forces to those of the Asiatic Christians, they counted above 300,000 fighting men. Acre surrendered the 13th of July 1191; but the unhappy disagreement which took place between Philip and Richard, rivals of glory and of interest, did more mischief than could be compensated by the successful exertions of those 300,000 men. Philip, tired of these divisions, and displeased with the behaviour of Richard his vassal, returned to his own country, which, perhaps, he should never have left, or at least have been again with more glory. Besides, he was attacked (say historians) with a languishing disorder, the effects of which were attributed to poison; but which might have been occasioned merely by the scorching heat of a climate so different from that of France. He lost his hair, his beard, and his nails; nay, his very flesh came off. The physicians urged him to return home; and he soon determined to follow their advice. The year after, he obliged Baudouin VIII. count of Flanders to leave him the county of Artois. He next turned his arms against Richard king of England, from whom he took Evreux and Vexin; though he had promised upon the holy gospels never to take any advantage of his rival during his absence; so that the consequences of this war were very unfortunate. The French monarch, repulsed from Rouen with loss, made a truce for six months; during which time he married Ingelburge, princess of Denmark, whose beauty could only be equalled by her virtue. The divorcing of this lady, whom he quitted in order to marry Agnes daughter of the duke of Merania, embroiled him with the court of Rome. The pope issued a sentence of excommunication against him; but it was taken off upon his promising to take back his former wife. John Sans-terre, succeeded to the crown of England in 1199, to the prejudice of his nephew Arthur, to whom of right it belonged. The nephew, supported by Phi-

Philip.

Philip took arms against the uncle, but was defeated in Poitou, where he was taken prisoner, and afterwards murdered. The murderer being summoned before the court of the peers of France, not having appeared, was declared guilty of his nephew's death, and condemned to lose his life in 1203. His lands, situated in France, were forfeited to the crown. Philip soon set about gathering the fruit of his vassal's crime. He seized upon Normandy, then carried his victorious arms into Maine, Anjou, Touraine, Poitou, and brought those provinces, as they anciently were, under the immediate authority of his crown. The English had no other part left them in France but the province of Guienne. To crown his good fortune, John his enemy was embroiled with the court of Rome, which had lately excommunicated him. This ecclesiastical thunder was very favourable for Philip. Innocent II. put into his hands, and transferred to him, a perpetual right to the kingdom of England. The king of France, when formerly excommunicated by the pope, had declared his censures void and abusive; he thought very differently, however, when he found himself the executor of a bull investing him with the English crown. To give the greater force to the sentence pronounced by his holiness, he employed a whole year in building 1700 ships, and in preparing the finest army that was ever seen in France. Europe was in expectation of a decisive battle between the two kings, when the pope laughed at both, and artfully took to himself what he had bestowed upon Philip. A legate of the holy see persuaded John Sans terre to give his crown to the court of Rome, which received it with enthusiasm. Then Philip was expressly forbid by the pope to make any attempt upon England, now become a see of the Roman church, or against John who was under her protection. Meanwhile, the great preparations which Philip had made alarmed all Europe; Germany, England, and the Low-Countries were united against him in the same manner as we have seen them united against Louis XIV. Ferrand, count of Flanders, joined the emperor Otho IV. He was Philip's vassal; which was the strongest reason for declaring against him. The French king was nowise disconcerted; his fortune and his courage dissipated all his enemies. His valour was particularly conspicuous at the battle of Bouvines, which was fought on the 27th of July 1214, and lasted from noon till night. Before the engagement, he knew well that some of his nobles followed him with reluctance. He assembled them together; and placing himself in the midst of them, he took a large golden cup, which he filled with wine, and into which he put several slices of bread. He eat one of them himself, and offering the cup to the rest, he said, "My companions, let those who would live and die with me follow my example." The cup was emptied in a moment, and these who were the least attached to him fought with all the bravery that could be expected from his warmest friends. It is also reported, that after showing the army the crown that was worn by sovereigns upon these occasions, he said, "If any one thought himself more worthy than he was to wear it, he had only to explain himself; that he should be content it were the prize of that man who should display the greatest valour in battle." The enemy had an army of 150,000 fighting men; that of Philip was not half so numerous; but it was composed of the flower of his nobility. The king run great hazard of his life; for he was thrown down under the horses feet, and wounded in the neck. It is said 30,000 Germans were killed; but the number is probably much exaggerated. The counts of Flanders and Boulogne were led to Paris with irons upon their feet and hands; a barbarous custom which prevailed at that time. The French king made no conquest on the side of Germany after this ever memorable action; but it gained him an additional power over his vassals. Philip, conqueror of Germany, and possessor of almost all the English dominions in France, was invited to the crown of England by the subjects of King John, who were grown weary of his tyranny. The king of France, upon this occasion, conducted himself like an able politician. He persuaded the English to ask his son Louis for their king; but as he wished at the same time to manage the pope, and not lose the crown of England, he chose to assist the prince his son, without appearing to act himself. Louis made a descent upon England, was crowned at London, and excommunicated at Rome in 1216; but that excommunication made no change upon John's situation, who died of grief. His death extinguished the resentment of the English, who having declared themselves for his son Henry III. forced Louis to leave England. Philip-Augustus died a little time after, at Mantes, the 14th of July 1223, aged 59, after a reign of 43 years. Of all the kings of the 3d race, he made the greatest accession to the crown-lands, and transmitted the greatest power to his successors. He reunited to his dominions Normandy, Anjou, Maine, Touraine, Poitou, &c. After having subdued John Sans-terre, he humbled the great lords, and by the overthrow of foreign and domestic enemies, took away the counterpoise which balanced his authority in the kingdom. He was more than a conqueror; he was a great king and an excellent politician; fond of splendour on public occasions, but frugal in private life; exact in the administration of justice; skilful in employing alternately flattery and threatenings rewards and punishments; he was zealous in the defence of religion, and always disposed to defend the church; but he knew well how to procure from her succours for supplying the exigencies of the state. The lords of Comy, Rhetel, Roscy, and several others, seized upon the property of the clergy. A great many of the prelates applied for protection to the king, who promised them his good offices with the depredators. But, notwithstanding his recommendations, the pillages continued. The bishops redoubled their complaints, and intreated Philip to march against their enemies. "With all my heart (said he): but in order to fight them, it is necessary to have troops, and troops cannot be raised without money." The clergy understood his meaning; they furnished subsidies, and the pillages ceased. The enterprises of Philip-Augustus were almost always successful; because he formed his projects with deliberation, and executed them without delay. He began by rendering the French happy, and in the end rendered them formidable; though he was more inclined to anger than to gentleness, to punish than to pardon, he was regretted by his subjects as a powerful genius and

Philip. as the father of his country. It was in his reign that the marshal of France was seen, for the first time, at the head of the army. It was then, also, that families began to have fixed and hereditary surnames; the lords took them from the lands which they possessed; men of letters from the place of their birth; the converted Jews and rich merchants from that of their residence. Two very cruel evils, viz. leprosy and usury, were prevalent at that time; the one infected the body, the other proved the ruin of the fortunes of families. The number of lepers was so great, that the smallest villages were obliged to have an hospital for the cure of that disorder. It is remarkable, that when Philip was on the point of engaging Richard, the English, who were lying in ambush near the Loire, run away with his equipages, in which he caused to be carried all the deeds or writings respecting the rights of the crown; a custom which is used at this day by the grand seigneur. Philip caused copies of his charters to be collected wherever they could be found; but after all his endeavours, some of them were never recovered. The surname of *Augustus* was given to Philip by his contemporaries. Mezerai is mistaken, when he asserts that Paulus Emilius was the first who rendered the name of *conqueror* by that of *Augustus*; a learned critic has proved the contrary by undoubted authorities.

Philip of Valois, first king of France of the collateral branch of the Valois, was son to Charles count of Valois, brother of Philip the Fair. He mounted the throne in 1328, on the death of his cousin Charles the Fair, after having held for some time the regency of the kingdom. France was much divided in the beginning of his reign, by disputes about the succession to the crown. Edward III. king of England laid claim to it as grandson of Philip the Fair, by his mother; but Philip of Valois took possession of it as first prince of the blood. The people gave him, upon his accession to the throne, the title of *fortunate*; to which might have been added, for some time, those of *valorous* and *just*. He marched to the relief of his vassal the count of Flanders, whose subjects, on account of bad usage, had taken up arms against him. He engaged the rebels at Cassel, performed prodigies of valour, and gained a signal victory, the 24th of August 1328. Having made all quiet, he went home, after saying to the count of Flanders, "Be more prudent and more humane, and you will have fewer disloyal subjects." The victorious Philip devoted the time of peace to the internal regulations of his kingdom. The financiers were called to an account, and some of them condemned to death; among others Peter Remi, general of the finances, who left behind him near 20 millions. He afterwards enacted the law respecting freeholds, imposing a tax upon churches, and commoners who had acquired the lands of the nobility. Then, also, began to be introduced the form of *appeal comme d'abus*, the principles of which are more ancient than the name. The year 1329 was distinguished by a solemn homage paid to Philip, by Edward king of England, for the duchy of Guienne, upon his knees, and with his head uncovered. The interior peace of the kingdom was disturbed by disputes about the distinction of the church and state. An assembly was summoned for hearing the two parties, in the presence of the king: and in this assembly Peter de Cugnieres, his

majesty's advocate, defended the secular jurisdiction with great ability as a man well-informed, and an enlightened philosopher. Bertrand bishop of Autun, and Roger archbishop of Sens, pled the cause of the clergy with less ingenuity and judgment. This did not, however, prevent the king from showing them favours, though the controversy itself laid the foundation of all the disputes which were afterwards agitated about the authority of the two powers; disputes which contributed not a little to confine the ecclesiastical jurisdiction within narrower limits. While Philip was employing himself in some useful regulations, he was unhappily interrupted by Edward III. declaring war against France. This prince immediately recovered those parts of Guienne of which Philip was in possession. The Flemish having again revolted from France in spite of oaths and treaties, joined the standard of Edward; and required that he would assume the title of *king of France*, in consequence of his pretensions to the crown; because then, agreeably to the letter of their treaty, they only followed the king of France. From this period is dated the union of the flower-de-luce and leopards in the arms of England. Edward, in order to justify the change of his arms, caused the following manifesto to be published in the verse of the times.

Philip.

*Rex sum regnorum, bina ratione, duorum:
Anglorum in regno sum rex ego jure paterno;
Matris jure quidem Francorum nuncupor idem:
Hinc est armorum variatio facta meorum.*

In the way of a parody to these lines, Philip made the following reply:

*Prædo regnorum qui diceris esse duorum,
Francorum regno privaberis, atque paterno.
Succedunt mares huic regno, non mulieres:
Hinc est armorum variatio stulta tuorum.*

In the mean time Philip put himself in a posture of defence. His arms were at first attended with some success; but those advantages were far from compensating the loss of the battle of Ecluse, in which the French fleet, consisting of 120 large ships, and manned by 40,000 seamen, was beat by that of England in the year 1340. This defeat is to be attributed, in part, to the little attention which had been paid to the navy of France, notwithstanding her favourable situation, by being washed by two seas. She was obliged to make use of foreign ships, which obeyed but slowly, and even with some reluctance. This war, which had been alternately discontinued and renewed, begun again with more heat than ever in 1345. The two armies having come to an engagement the 26th of August 1346, near Crecy, a village in the county of Ponthieu, the English there gained a signal victory. Edward had only 40,000 men, while Philip had nearly twice that number; but the army of the former was inured to war, and that of the latter was ill-disciplined and overcome with fatiguing marches. France lost from 25,000 to 30,000 men; of which numbers were John king of Bohemia (who, though blind, fought gallantly), and about 1500 gentlemen, the flower of the French nobility. The loss of Calais, and several other places, was the sad fruit of this defeat. Some time before Edward had challenged Philip of Valois

Philip to a full crown, in which he refused to condescend; but from the idea he was inspired for a foreign prince to accept a crown, Charles king was prevailed. At length, after a war for six months was carried on between the king and his subjects, he was obliged to retire to Italy, and afterwards to France. In the year 1550, aged 57 years, and far from bearing on his countenance the mark of *Fortitude*. He had, however, reunited Dauphiny to France. Humbert, the last prince of that country, having lost all his children, and wearied with the wars which he had held out against Savoy, turned a Dominican, and gave his province to Philip, in 1544, on condition that he should be one of the kings of France; and he was the first of Dauphin. Philip likewise added to his domain Roussillon and a part of Catalonia, by lending some money to the king of Majorca, who gave him those provinces as a security; provinces which Charles VIII. afterwards restored without any reimbursement. It is surprising that in so unfortunate a reign he should have been able to purchase those provinces after having paid a great deal for Dauphiny; but the duty on salt, the rise on the other taxes, and especially the frauds committed in the coinage of money, are supposed to have enabled him to make those acquisitions. The fictitious and ideal value of the coin was not only raised, but a great deal of bad money was issued from the mint. The officers of the mint were sworn upon the gospels to keep the secret; but how could Philip flatter himself that so gross a fraud would not be discovered?

Philip II. son of Charles V. and of Isabella of Portugal, who was born at Valladolid on the 21st of May 1527, became king of Naples and Sicily by his father's abdication in 1554. He ascended the throne of Spain on the 17th of January 1556 by the same means. Charles had made a truce with the French, but his son broke it; and having formed an alliance with England, poured into Picardy an army of 40,000 men. The French were cut to pieces at the battle of St Quintin, which was fought on the 20th of August 1557. That town was taken by assault, and the day on which the breach was mounted Philip appeared armed cap-a-pee in order to animate the soldiers. It was the first and last time that he was observed to wear this military dress. It is well known, indeed, that his terror was so great during the action that he made two vows; one, that he should never again be present in a battle; and the other, to build a magnificent monastery dedicated to St Lawrence, to whom he attributed the success of his arms, which he executed at Beaulieu, a village about seven leagues from Madrid. After the engagement, his general, the Duke of Savoy, wanted to kiss his hand; but Philip prevented him, saying, "It is rather my duty to kiss yours, who have the merit of so glorious a victory;" and immediately presented him with the colours taken during the action. The taking of Catelet, Ham, and Noyon, were the only advantages which were derived from a battle which might have proved the ruin of France. When Charles V. was informed of this victory, it is said he asked the person who brought him the intelligence, "if his son was at Paris?" and being answered in the negative, he went away without uttering a single word. The Duke of Guise having had time to

assemble an army, repaired the disgrace of his country by the taking of Calais and Thionville. While he was animating the French, Philip gained a pretty considerable battle against Marshall de Thermes near Gravelines. His army was, on this occasion, commanded by Count Egmont, whom he afterwards caused to be beheaded. The conqueror made no better use of the victory of Gravelines than he had done of that of St Quintin; but he reaped considerable advantage from the glorious peace of Cateau-Cambresis, the master-piece of his politics. By that treaty, concluded the 13th of April 1559, he gained possession of the strong places of Thionville, Mariembourg, Montmedy, Hesdin, and the county of Charollois. This war, so terrible, and attended with so much cruelty, was terminated, like many others, by a marriage. Philip took for his third wife Elizabeth, daughter of Henry II. who had been promised to Don Carlos.

After these glorious achievements, Philip returned in triumph to Spain, without having drawn a sword. His first care, upon his arrival at Valladolid, was to demand of the grand inquisitor the spectacle of an *auto-da-fé*. This was immediately granted him; 40 wretches, some of whom were priests or monks, were strangled and burnt, and one of them was burnt alive. Don Carlos de Seza, one of those unfortunate victims, ventured to draw near to the king, and said to him, "How, Sir, can you suffer so many wretches to be committed to the flames? Can you be witness of such barbarity without weeping?" To this Philip coolly replied, "If my own son were suspected of heresy, I would myself give him up to the severity of the inquisition. Such is the horror which I feel when I think of you and your companions, that if an executioner were wanting, I would supply his place myself." On other occasions he conducted himself agreeably to the spirit which had dictated this answer. In a valley of Piedmont, bordering on the country of the Milanese, there were some heretics; and the governor of Milan had orders to put them all to death by the gibbet. The new opinions having found their way into some of the districts of Calabria, he gave orders that the innovators should be put to the sword, with the reservation of 60 of them, of whom 30 were afterwards strangled, and the rest committed to the flames.

This spirit of cruelty, and shameful abuse of his power, had the effect to weaken that power itself. The Flemish, no longer able to bear so hard a yoke, revolted. The revolution began with the fine and large provinces of the continent; but the maritime provinces only obtained their liberty. In 1579 they joined themselves into a republic, under the title of the United Provinces. Philip sent the Duke of Alba to reduce them; but the cruelty of that general only served to exasperate the spirit of the rebels. Never did either party fight with more courage, or with more fury. The Spaniards, at the siege of Haerlem, having thrown into the town the head of a Dutch officer who had been killed in a skirmish, the inhabitants threw to them the heads of eleven Spaniards, with this inscription: "Ten heads for the payment of the tenth penny, and the eleventh for interest." Haerlem having surrendered at discretion, the conquerors caused all the magistrates, all the pastors, and above 1000 citizens, to be hanged.

Philip. The Duke of Alba, being at length recalled, the grand commander of the Requesnes was sent in his place, and after his death Don John of Austria; but neither of those generals could restore tranquillity in the Low Countries. To this son of Charles V. succeeded a grandson no less illustrious, namely, Alexander Farnese duke of Parma, the greatest man of his time; but he could neither prevent the independence of the United Provinces, nor the progress of that republic which arose on his own eye. It was then that Philip, always at his ease in Spain, instead of coming to reduce the rebels in Flanders, proscribed the Prince of Orange, and set 25,000 crowns upon his head. William, superior to Philip, disdained to make use of that kind of vengeance, and trusted to his sword for his preservation.

In the mean time the king of Spain succeeded to the crown of Portugal, to which he had a right by his mother Isabella. This kingdom was subjected to him by the Duke of Alba, in the space of three weeks, in the year 1580. Antony, prior of Crato, being proclaimed king by the populace of Lisbon, had the resolution to come to an engagement; but he was vanquished, pursued, and obliged to fly for his life.

A cowardly assassin, Balthazar Gerard, by a pistol-shot killed the Prince of Orange, and thereby delivered Philip from his most implacable enemy. Philip was charged with this crime, it is believed without reason; though, when the news was communicated to him, he was imprudent enough to exclaim, "If this blow had been given two years ago, the Catholic religion and I would have gained a great deal by it."

This murder had not the effect to restore to Philip the Seven United Provinces. That republic, already powerful by sea, assisted England against him. Philip having resolved to distress Elizabeth, fitted out, in 1588, a fleet called the *Invincible*. It consisted of 150 large ships, on which were counted 2650 pieces of cannon, 8000 seamen, 20,000 soldiers, and all the flower of the Spanish nobility. This fleet, commanded by the Duke of Medina Sidonia, sailed from Lisbon when the season was too far advanced; and being overtaken by a violent storm, a great part of it was dispersed. Twelve ships, driven upon the coast of England, were captured by the English fleet, which consisted of 100 ships, 50 were wrecked on the coasts of France, Scotland, Ireland, Holland, and Denmark. Such was the success of the *Invincible*. See *ARMADA*.

This enterprise, which cost Spain 40 millions of ducats, 20,000 men, and 100 ships, was productive only of disgrace. Philip supported this misfortune with an heroic resolution. When one of his courtiers told him, with an air of consternation, what had happened, he coolly replied, "I sent to fight the English, and not the winds. God's will be done." The day after Philip ordered the bishops to return thanks to God for having preserved some remains of his fleet; and he wrote thus to the pope: "Holy father, as long as I remain master of the mountain head, I shall not much regard the loss of a rivulet. I will thank the Supreme Disposer of empires, who has given me the power of easily repairing a disaster which my enemies must attribute solely to the elements which have fought for them."

At the same time that Philip attacked England, he was encouraging in France the Holy League; the ob-

ject of which was to overturn the throne and divide the state. The leaguers conferred upon him the title of *Protector* of their association; which he eagerly accepted, from a persuasion that their exertions would soon conduct him, or one of his family, to the throne of France. He thought himself so sure of his prey, that when speaking of the principal cities in France, he used to say, "My fine city of Paris, my fine city of Orleans," in the same manner as he would have spoken of Madrid and Seville. What was the result of all those intrigues? Henry IV. embraced the Catholic religion, and by his abjuration of Protestantism made his rival lose France in a quarter of an hour.

Philip, at length, worn out by the debaucheries of his youth, and by the toils of government, drew near his last hour. A slow fever, the most painful sort, and a complication of other disorders, could not disengage him from business, nor draw from him the least complaint. "What!" said he to the physicians who hesitated about letting blood of him; "What! are you afraid of drawing a few drops of blood from the veins of a king who has made whole rivers of it flow from heretics?" At last, exhausted by a complication of distempers, which he bore with an heroic patience, and being eaten up of lice, he expired the 13th of September 1598, aged 72 years, after a reign of 43 years and eight months. During the last 50 days of his illness he showed a great sense of religion, and had his eyes almost always fixed towards heaven.

No character was ever drawn by different historians in more opposite colours than that of Philip; and yet, considering the length and activity of his reign, there is none which it should seem would be more easy to ascertain. From the facts recorded in history, we cannot doubt that he possessed, in an eminent degree, penetration, vigilance, and a capacity for government. His eyes were continually open upon every part of his extensive dominions. He entered into every branch of administration; watched over the conduct of his ministers with unwearied attention; and in his choice both of them and of his generals discovered a considerable share of sagacity. He had at all times a composed and settled countenance, and never appeared to be either elated or depressed. His temper was the most imperious, and his looks and demeanor were haughty and severe; yet among his Spanish subjects he was of easy access; listened patiently to their representations and complaints; and where his ambition and bigotry did not interfere, was generally willing to redress their grievances. When we have said thus much in his praise, we have said all that truth requires or truth permits. It is indeed impossible to suppose that he was insincere in his zeal for religion. But as his religion was of the most corrupt kind, it served to increase the natural depravity of his disposition; and not only allowed, but even prompted, him to commit the most odious and shocking crimes. Although a prince in the highest degree of Philip might be persuaded that the interest of religion would be advanced by falsehood and persecution; yet it might be expected, that, in a virtuous prince, the sentiments of honour and humanity would on some occasions triumph over the dictates of superstition; but on this count there occurs not a single instance in the reign of Philip; who without hesitation violated the most sacred reli-

Philip.

W. of Spain
Philip II.

Philip.

gations as often as religion afforded him a pretence, and under that pretence exercised for many years the most unrelenting cruelty without reluctance or remorse. His ambition, which was exorbitant; his resentment, which was implacable; his arbitrary temper, which would submit to no controul—concurred with his bigotted zeal for the Catholic religion, and carried the sanguinary spirit, which that religion was calculated to inspire, to a greater height in Philip than it ever attained in any other prince of that or of any former or succeeding age.

Though of a small size, he had an agreeable person. His countenance was grave, his air tranquil, and one could not discover from his looks either joy in prosperity or chagrin in adversity. The wars against Holland, France, and England, cost Philip 564 millions of ducats; but America furnished him with more than the half of that sum. His revenues, after the junction of Portugal, are said to have amounted to 25 millions of ducats, of which he only laid out 100,000 for the support of his own household. Philip was very jealous of outward respect; he was unwilling that any should speak to him but upon their knees. The duke of Alba having one day entered this prince's cabinet without being introduced, he received the following harsh salutation, accompanied with a stormy countenance: "An impudence like this of your's would deserve the hatchet." If he thought only how to make himself be feared, he succeeded in doing so; for few princes have been more dreaded, more abhorred, or have caused more blood to flow, than Philip II. of Spain. He had successively, if not all at once, war to maintain against Turkey, France, England, Holland, and almost all the Protestants of the empire, without having a single ally, not even the branch of his own house in Germany. Notwithstanding so many millions employed against the enemies of Spain, Philip found in his economy and his resources wherewith to build 30 citadels, 64 fortified places, 9 sea-ports, 25 arsenals, and as many palaces, without including the escurial. His debts amounted to 140 millions of ducats, of which, after having paid seven millions of interest, the greatest part was due to the Genoese. Moreover, he had sold or alienated a capital stock of 120 millions of ducats in Italy. He made a law, fixing the majority of the kings of Spain at 14 years of age. He affected to be more than commonly devout; he eat often at the refectory with the monks; he never entered their churches without kissing all the relics; he caused knead his bread with the water of a fountain which was thought to possess a miraculous virtue; he boasted of never having danced, and of never wearing breeches after the Grecian fashion. Grave and solemn in all his actions, he drove from his presence a woman who had smiled while he was blowing his nose. One great event of his domestic life is the death of his son Don Carlos. The manner of this prince's death is not certainly known. His body, which lies in the monument of the escurial, is there separated from his head; but it is pretended that the head is separated only because the leaden coffin which contains the body is too small. The particulars of his crime are as little known as the manner in which it was committed. There is no evidence, nor is there any probability, that Philip would have caused him to be con-

demned by the inquisition. All that we know of the matter is, that in 1568 his father, having discovered that he had some correspondence with the Hollanders his enemies, arrested him himself in his own room. He wrote at the same time to Pope Pius V. in order to give him an account of his son's imprisonment; and in his letter to this pontiff, the 20th of January 1568, he says, "that from his earliest years the strength of a wicked nature has stifled in Don Carlos every paternal instruction." It was Philip II. who caused to be printed at Anvera, between 1569 and 1572, in 8 vols folio, the fine Polyglot Bible, which bears his name; and it was he who subjected the islands afterwards called the *Philippines*. He married successively, 1st, Mary daughter of John III. king of Portugal; 2dly, Mary daughter of Henry VIII. and queen of England; 3dly, Elizabeth of France, daughter of Henry II.; 4thly, Anne, daughter of the Emperor Maximilian II. Don Carlos was the son of his first wife, and Philip III. of the last.

PHILIPPI (anc. geog.), a town of Macedonia, in the territory of the Edones, on the confines of Thrace (Pliny, Ptolemy), situated on the side of a steep eminence; anciently called *Datum* and *Drenides* (Appian), though Strabo seems to distinguish them. This town was famous on several accounts; not only as taking its name from the celebrated Philip of Macedon, father to Alexander the Great, who considered it as a fit place for carrying on the war against the Thracians; but also on account of two battles fought in its neighbourhood between Augustus and the republican party. In the first of these battles, Brutus and Cassius had the command of the republican army; while Octavianus, afterwards Augustus, and Mark Antony, had the command of their adversaries. The army of Brutus and Cassius consisted of 19 legions and 20,000 horse; the imperial forces of an equal number of legions, but more complete, and 13,000 horse; so that the numbers on both sides were pretty equal. The troops of Brutus were very richly dressed, most of them having their armour adorned with gold and silver; for Brutus, though very frugal in other respects, was thus extravagant with respect to his men, thinking that the riches that they had about them would make them exert themselves the more, to prevent these from falling into the enemy's hands. Both the republican generals appear to have been inferior in skill to Mark Antony; for as to Octavianus, he is allowed never to have conquered but by the valour of others. A little before the first engagement, Octavianus, who had been indisposed, was carried out of the camp, at the persuasion of Artorius his physician, who had dreamed that he saw a vision directing him to be removed. Brutus's men, who opposed the wing commanded by Octavianus, charged without orders, which caused great confusion. However, they were successful; for part of them, taking a compass about, fell upon the enemy's rear: after which they took and plundered the camp making a great slaughter of such as were in it, and among the rest putting 2000 Lacedemonians to the sword who were newly come to the assistance of Octavianus. The emperor himself was sought for, but in vain, having been conveyed away for the reason above-mentioned; and as the soldiers pierced the litter in which he was usually carried, it was thence reported that

Philippi.

Philippi,
Philippics.

that he had been killed. This threw that whole part of the army into such consternation, that when Brutus attacked them in front, they were most completely routed; three whole legions being cut in pieces, and a prodigious slaughter made among the fugitives. But by the imprudence of the general in pursuing too far, the wing of the republican army commanded by Cassius was left naked and separated from the rest of the army; on which they were attacked at once in front and in flank, and thus they were defeated and their camp taken, while Brutus imagined that he had gained a complete victory. Cassius himself retired to an eminence at a small distance from Philippi; whence he sent one of his greatest intimates to procure intelligence concerning the fate of Brutus. That general was on his way, and already in view, when the messenger set out. He soon met his friends; but they surrounding him to inquire the news, Cassius, who beheld what passed, imagined that he was taken prisoner by the enemy, retired to his tent, and in despair caused one of his freedmen cut off his head. Thus far at least is certain, that he went into the tent with that freedman, and that his head was found separated from his body when Brutus entered. However, the freedman was never afterwards seen.

The second engagement was pretty similar to the first. Brutus again opposed Octavianus, and met with the same success; but in the mean time Antony, to whom he ought undoubtedly to have opposed himself, having to do only with the lieutenants of Cassius, gained a complete victory over them. What was worst, the fugitives, instead of leaving the field of battle altogether, fled for protection to Brutus's army; where, crowding in among the ranks, they carried despair and confusion wherever they went, so that a total defeat ensued, and the republican army was almost entirely cut in pieces. After the battle, Brutus put an end to his own life, as is related more fully under the article *ROME*.

The city of Philippi is likewise remarkable on account of an epistle written by St Paul to the church in that place. It was a Roman colony (Luke, Pliny, Coin, Inscription). It is also remarkable for being the birth-place of Adrastus, the Peripatetic philosopher, and disciple of Aristotle.—The town is still in being, and is an archbishop's see; but greatly decayed and badly peopled. However, there is an old amphitheatre, and several other monuments of its ancient grandeur. E. Long. 44. 55. N. Lat. 41. 0.

PHILIPPICS, ΦΙΛΙΠΠΙΚΟΙ ΛΟΓΟΙ, in literature, is a name which is given to the orations of Demosthenes against Philip king of Macedon. The Philippics are reckoned the master-pieces of that great orator: Longinus quotes many instances of the sublime from them; and points out a thousand latent beauties. Indeed that pathetic in which Demosthenes excelled, the frequent interrogations and apostrophes wherewith he attacked the indolence of the Athenians, where could they be better employed? Whatever delicacy there be in the oration against Leptines, the Philippics have the advantage over it, were it only on account of the subject, which gives Demosthenes so fair a field to display his chief talent, we mean, with Longinus, that of moving and astonishing.

Dionytius Halicarnassensis ranks the oration on the

Halonese among the Philippics, and places it the eighth in order: but though his authority be great, yet that force and majesty wherein Cicero characterises the Philippics of Demosthenes, seem to exclude the oration on the Halonese out of the number; and authorise the almost universal opinion of the learned, who reject it as spurious. Libanius, Photius, and others, but above all the languidness of the style, and the lowness of the expressions, which reign throughout the whole, father it on Hegesippus.

PHILIPPIC is likewise applied to the fourteen orations of Cicero against Mark Antony. Cicero himself gave them this title in his epistles to Brutus; and posterity have found it so just, that it has been continued to our times. Juvenal, Sat. x. calls the second the *divine Philippic*, and witnesses it to be of great fame, *conspicua divina Philippica fame*. That orator's intitling his last and most valued orations after the Philippics of Demosthenes shows the high opinion he had of them. Cicero's Philippics cost him his life; Mark Antony having been so irritated with them, that when he arrived at the triumvirate, he procured Cicero's murder, cut off his head, and stuck it up in the very place whence the orator had delivered the Philippics.

PHILIPPINE ISLANDS, are certain islands of Asia, which lie between 114 and 126 degrees of east longitude, and between 6 and 20 degrees of north latitude; about 300 miles south-east of China. They *Bentley's* are said to be about 1200 in number, of which there *Mil. Mem.* are 400 very considerable. They form a principal division of that immense Indian Archipelago, which consists of so many thousand islands, some of which are the largest, and many of them the richest, in the world. The Philippines form the northernmost cluster of these islands, and were discovered in the year 1521 by the famous navigator Ferdinand Magellan, a Portuguese gentleman, who had served his native country both in the wars of Africa and in the East Indies; particularly under Albuquerque, the famous Portuguese general, who reduced Goa and Malacca to the obedience of that crown. Magellan having had a considerable share in those actions, and finding himself neglected by the government of Portugal, and even denied, as it is said, the small advance of a ducat a month in his pay, left the court of Portugal in disgust, and offered his services to Charles V. then emperor of Germany and king of Spain, whom he convinced of the probability of discovering a way to the Spice Islands, in the East Indies, by the west; whereupon the command of five small ships being given him, he set sail from Seville, on the 10th of August 1519, and standing over to the coast of South America, proceeded southward to 52°, where he fortunately hit upon a strait, since called the *Strait of Magellan*, which carried him into the Pacific Ocean or South Sea; and then steering northward, repassed the equator: after which, he stretched away to the west, across that vast ocean, till he arrived at Guam, one of the Ladrões, on the 10th of March 1521; and soon after sailed to the westward, and discovered the Philippines, which he did on St Lazarus's day; and, in honour of that saint, he called them the *Archipelago of St Lazarus*. He took possession of them in the name of the king of Spain, but happened to be killed in a skirmish he had with the natives of one of them. His paper, however,

Philippic,
Philippine
Islands.

however, arrived afterwards at the Molucca, or Clove Islands, where they left a colony, and returned to Spain by the way of the Cape of Good Hope; being the first persons that ever sailed round the globe.— But there was no attempt made by the Spaniards to subdue or plant the Philippine Islands until the year 1564, in the reign of Philip II. son of Charles V. when Don Louis de Velasco, viceroy of Mexico, sent Michael Lopez Delagafes thither with a fleet, and a force sufficient to make a conquest of these islands, which he named the *Philippines*, in honour of Philip II. then upon the throne of Spain; and they have remained under the dominion of that crown till taken by Sir William Draper. The Philippines are scarce inferior to any other islands of Asia in all the natural productions of that happy climate; and they are by far the best situated for an extensive and advantageous commerce. By their position, they form the centre of intercourse with China, Japan, and the Spice Islands; and whilst they are under the dominion of Spain, they connect the Asiatic and American commerce, and become a general magazine for the rich manufactures of the one and for the treasures of the other. Besides, they are well situated for a supply of European goods, both from the side of Acapulco and by the way of the Cape of Good Hope. In fact, they formerly enjoyed a traffic in some degree proportioned to the peculiar felicity of their situation; but the Spanish dominion is too vast and unconnected to be improved to the best advantage.— The spirit of commerce is not powerful in that people. The trade of the Philippines is thought to have declined; its great branch is now reduced to two ships, which annually pass between these islands and Acapulco in America, and to a single port of Manila in the island of Luconia.

Indeed the Spaniards appear by no means to be actuated by the spirit of industry: for, so far from improving the fine situation of these islands to the utmost, it happens, on the contrary, that the trade is hurtful to the mother-country; for (to confine ourselves to Manila, with which they have most to do), instead of taking Spanish manufactures, they trade with the Chinese for spices, silks, stockings, Indian stuffs, calicoes, chintz, and many other articles; and with the Japanese for cabinets, and all sorts of lacquered ware; for all which they pay in gold or silver. All these commodities, together with what the islands produce, and great quantities of wrought plate by the Chinese artificers, are collected at Manila, and transported annually in two ships to Acapulco in Mexico. Each of these ships is esteemed worth L. 600,000 Sterling; and in the war which began in 1739, and which was not distinguished by such a series of wonderful successes as that which ended in 1763, the taking of one of the galleons which carry on the trade between Manila and America, was considered as one of the most brilliant advantages which we gained. This trade is not laid open to all the inhabitants of Manila, but is confined by very particular regulations, somewhat analogous to those by which the trade of the regular ships

from Cadiz to the West Indies is restrained. The ships employed are all king's ships, commissioned and paid by him; and the tonnage is divided into a certain number of bales, all of the same size. These are divided among the convents at Manila, but principally the Jesuits (A), as a donation to support their missions, for the propagation of the Roman Catholic faith. Most of the religious are concerned in this trade, and sell to the merchants at a great price what room in the ship they are not to occupy. This trade is by a royal edict limited to a certain value, but it always exceeds it, each ship being generally worth 3,000,000 of dollars. The returns made from America are in silver, cochineal, sweetmeats, together with some European millinery ware for the women, and some strong Spanish wine. It is obvious, that the greatest part of the treasure remitted does not remain at Manila, but is dispersed over India for goods. Many strong remonstrances against this Indian trade to Mexico have been made to the court of Spain, wherein they urge, that the silk manufactories of Valencia and other parts of Spain, the linens from Cadiz, and their other manufactories, are hurt in their sale in Mexico and Peru, by the Chinese being able to afford them goods of the same sort cheaper than they are able; that were this trade laid open, the whole treasure of the New World would centre in Spain, or with European merchants; but now it enriches only the Jesuits and a few private persons. Wise as these arguments are, the Jesuits and priests, versant in intrigue, and the most selfish set of men on earth, had interest enough at court to stop the effect.

At Cavite in this bay are a fort, a town, and a fine dock-yard, where these large galleons are built and repaired, and where they load and unload, together with all the other large ships that trade to this bay.

The principal of the Philippine islands are Luconia or Manila, Tandago or Samul, Masbate, Mindora, Luban, Paragoa, Panay, Leyte, Bohel, Sibiu, Sogbu, Negros, St John, Xolo, and Mindanao. In most of these, the Spanish power prevails, and all are under the governor of Luconia; but there are some in which that nation has little authority, or even influence, such as Mindanao.

The inhabitants of these islands consist of Chinese, Ethiopians, Malays, Spaniards, Portuguese, Pintados or Painted People, and Mettees, a mixture of all these. Their persons and habits resemble those of the several nations whence they derive their original; only, it is observable, that the features of the blacks of these islands are as agreeable as those of the white people. There is not a soil in the world that produces greater plenty of all things for life; as appears by the multitude of inhabitants to be found in the woods and mountains, who subsist almost entirely by the fruits of the earth, and the venison they take. Nor can any country appear more beautiful; for there is a perpetual verdure, and buds, blossoms, and fruit, are found upon the trees all the year round, as well on the mountains as in the cultivated gardens. Vast quantities

(A) We do not know who has the Jesuits share since they were expelled the Spanish dominions.

Philippine
Islands.

ties of gold are washed down from the hills by the rains, and found mixed with the sand of their rivers. There are also mines of other metals, and excellent load-stones found here; and such numbers of wild buffaloes, that a good huntsman on horseback, armed with a spear, will kill 10 or 20 in a day. The Spaniards take them for their hides, which they sell to the Chinese; and their carcases serve the mountaineers for food. Their woods also abound with deer, wild hogs, and goats. Of the last, there is such plenty in one of these islands, that the Spaniards gave it the name of *Calbras*. Horses and cows have been likewise imported into these islands, from New Spain, China, and Japan, which have multiplied considerably; but the sheep that were brought over came to nothing. The trees produce a great variety of gums; one kind, which is the commonest, by the Spaniards called *brea*, is used instead of pitch; of the others some are medicinal, others odoriferous.

In those islands are monkeys and baboons of a monstrous bigness, that will defend themselves if attacked by men. When they can find no fruit in the mountains, they go down to the sea to catch crabs and oysters; and that the oysters may not close and catch their paws, they first put in a stone to prevent their shutting close: they take crabs by putting their tail in the holes where they lie, and when the crab lays hold of it, they draw him out. There are also great numbers of civet-cats in some of the islands. The bird called *tavan*, is a black sea-towl, something less than a hen, and has a long neck; it lays its eggs in the sand by the sea-side, 40 or 50 in a trench, and then covers them, and they are hatched by the heat of the sun. They have likewise the bird *faligan*, which builds her nest on the sides of rocks, as the swallows do against a wall; and these are the delicious *Birds-Nests* so much esteemed, being a kind of jelly that dissolves in warm water.

The Spaniards have introduced several of the American fruits, which thrive here as well as in America; the cocoa or chocolate-nut particularly, which increases so that they have no occasion now to import it from Mexico. Here is also the *Fountain-Tree*, from which the natives draw water; and there is likewise a kind of cane, by the Spaniards called *vaxuco*, which, if cut, yields fair water enough for a draught, of which there are plenty in the mountains, where water is most wanted.

These islands being hot and moist, produce abundance of venomous creatures, as the soil does poisonous herbs and flowers, which do not kill those who touch or taste them, but so infect the air, that many people die in the time of their blossoming.

The orange, lemon, and several other trees, bear twice a year. A sprig, when planted, becomes a tree and bears fruit in a year's time; so that without any hyperbole it may be affirmed, that a more luxuriant verdant soil can scarcely be conceived. The woods are filled with old, large, and lotty trees, and such as yield more sustenance to man than is to be found in almost any other part of the world. These islands, however, besides their other inconveniences, of which they have many, are very subject to earthquakes, which often prove very fatal. See *MANILA*.

Philippines

Philips.

PHILIPPINES, a religious society of young women at Rome, so called from their taking St Philip de Neri for their protector. The society consists of 100 poor girls, who are brought up till they are of age to be married, or become nuns, under the direction of some religious women, who teach them to read, write, and work, and instruct them in the duties of Christianity. They wear a white veil, and a black cross on their breast. See *MACEDONIA*.

PHILIPPISTS, a sect or party among the Lutherans; the followers of Philip Melancthon. He had strenuously opposed the Ubiquists, who arose in his time; and the dispute growing still hotter after his death, the university of Wittenberg, who espoused Melancthon's opinion, were called by the Flacians, who attacked it, *Philippists*.

PHILIPS (Fabian), was author of several books relating to ancient customs and privileges in England. He was born at Prestbury in Gloucestershire, September 28th 1601. When very young, he spent some time in one of the Inns of Chancery; and went from thence to the Middle Temple, where he became learned in the law. In the civil wars, he was a bold assertor of the king's prerogative; and was so passionate a lover of Charles I. that, two days before that illustrious monarch was beheaded, he wrote a protestation against the intended murder, and caused it to be printed, and affixed to posts in all public places. He likewise published, in 1649, 4to, a pamphlet intitled, "*Veritas Inconcreta*;" or King Charles I. no Man of Blood, but a Martyr for his People;" which was reprinted in 1660, 8vo. In 1653, when the courts of justice at Westminster, especially the Chancery, were voted down by Oliver's parliament, he published, "Considerations against the dissolving and taking them away;" for which he received the thanks of William Lenthall, Esq; speaker of the late parliament, and of the keepers of the liberties of England. He was for some time filazer for London, Middlesex, Cambridge-shire, and Huntingdonshire; and spent much money in searching records, and writing in favour of the royal prerogative. The only advantage he received for this attachment to the royal cause was, the place of one of the commissioners for regulating the law, worth L. 200 *per annum*, which only lasted two years. After the Restoration of Charles II. when the bill for taking away the tenures was depending in parliament, he wrote and published a book to show the necessity of preserving them, intitled, "*Tenenda non tollenda*;" or, the Necessity of preserving Tenures *in capite*, and by Knight's-service, which, according to their first institution, were, and are yet, a great part of the *salus populi*, &c. 1660," 4to. In 1653 he published, "The Antiquity, Legality, Reason, Duty, and Necessity of Pre-emption and Pourveyance for the King," 4to; and afterwards many other pieces upon subjects of a similar kind. He assisted Dr Bates in his "*Elenchus Motuum*;" especially in searching the records and offices for that work. He died, November 17th, 1690, in his 89th year; and was buried near his wife in the church of Twyford in Middlesex. He was a man well acquainted with records and antiquities; but his manner of writing is neither close nor well digested. He published a political pamphlet in 1681, intitled,

Philips.

intituled, "*Urfa Major et Minor*; showing that there is no such Fear, as is factitiously pretended, of Popery and arbitrary Power."

PHILIPS (Ambrose), an English poet, was descended from a very ancient and considerable family of that name in Leicestershire. He received his education at St John's college, Cambridge; during his stay at which university, he wrote his pastorals, which acquired him at the time so high a reputation. His next performance was, *The Life of Archbishop Williams*, written, according to Mr Cibber, to make known his political principles, which in the course of it he had a free opportunity of doing, as the archbishop, who is the hero of his work, was a strong opponent to the high-church measures.

When he quitted the university, and came to London, he became a constant attendant at, and one of the wits of, Button's coffee-house, where he obtained the friendship and intimacy of many of the celebrated geniuses of that age, more particularly of Sir Richard Steele, who, in the first volume of his *Tatler*, has inserted a little poem of Mr Philips's, which he calls a *Winter Piece*, dated from Copenhagen, and addressed to the earl of Dorset, on which he bestows the highest encomiums; and, indeed, so much justice is there in these his commendations, that even Mr Pope himself, who had a fixed aversion for the author, while he affected to despise his other works, used always to except this from the number.

The first dislike Mr Pope conceived against Mr Philips, proceeded from that jealousy of fame which was so conspicuous in the character of that great poet; for Sir Richard Steele had taken so strong a liking to the pastorals of the latter, as to have formed a design for a critical comparison of them with those of Pope, in the conclusion of which the preference was to have been given to Philips. This design, however, coming to Mr Pope's knowledge, that gentleman, who could not bear a rival near the throne, determined to ward off this stroke by a stratagem of the most artful kind; which was no other than taking the same task on himself; and, in a paper in the *Guardian*, by drawing the like comparison, and giving a like preference, but on principles of criticism apparently fallacious, to point out the absurdity of such a judgment. However, notwithstanding the ridicule that was drawn on him in consequence of his standing as it were in competition with so powerful an antagonist, it is allowed, that there are, in some parts of Philips's pastorals, certain strokes of nature, and a degree of simplicity, that are much better suited to the purposes of pastoral, than the more correctly turned periods of Mr Pope's versification. Mr Philips and Mr Pope being of different political principles, was another cause of enmity between them; which arose at length to so great a height, that the former, finding his antagonist too hard for him at the weapon of wit, had even determined on making use of a rougher kind of argument; for which purpose he even went so far as to hang up a rod at Button's for the chastisement of his adversary whenever he should come thither; which, however, Mr Pope declining to do, avoided the *argumentum baculinum*, in which he would, no doubt, have found himself on the weakest side of the question. Our author also wrote

Philips.

several dramatical pieces; *The Briton*, *Distressed Mother*, and *Humphrey Duke of Gloucester*; all of which met with success, and one of them is at this time a standard of entertainment at the theatres, being generally repeated several times in every season. Mr Philips's circumstances were in general, through his life, not only easy, but rather affluent, in consequence of his being connected, by his political principles, with persons of great rank and consequence. He was concerned with Dr Hugh Boulter, afterwards archbishop of Armagh, the right honourable Richard West, Esq; lord chancellor of Ireland, the reverend Mr Gilbert Burnet, and the reverend Mr Henry Stevens, in writing a series of papers called the *Free Thinker*, which were all published together by Mr Philips, in three volumes in 12mo.

In the latter part of Queen Anne's reign, he was secretary to the Hanover club, who were a set of noblemen and gentlemen who had formed an association in honour of that succession, and for the support of its interests, and who used particularly to distinguish in their toasts such of the fair sex as were most zealously attached to the illustrious House of Brunswick. Mr Philips's station in this club, together with the zeal shown in his writings, recommended him to the notice and favour of the new government. He was, soon after the accession of king George I. put into the commission of the peace, and appointed one of the commissioners of the lottery. And, on his friend Dr Boulter's being made primate of Ireland, he accompanied that prelate across St George's Channel, where he had considerable preferments bestowed on him, and was elected a member of the House of Commons there, as representative for the county of Armagh. At length, having purchased an annuity for life of 400 l. *per annum*, he came over to England some time in the year 1748; but having a very bad state of health, and being moreover of an advanced age, he died soon after, at his lodgings near Vauxhall, in Surry.

"Of his personal character (says Dr Johnson) all I have heard is, that he was eminent for bravery, and skill in the sword, and that in conversation he was solemn and pompous." He is somewhere called *Quaker Philips*, but, however, appears to have been a man of integrity; for the late Paul Whitehead relates, that when Mr Addison was secretary of state, Philips applied to him for some preferment, but was coolly answered, "that it was thought that he was already provided for, by being made a justice for Westminster." To this observation our author, with some indignation, replied, "Though poetry was a trade he could not live by, yet he scorned to owe subsistence to another which he ought not to live by."

The following anecdote is told of our author by Dr Johnson: "At a coffee-house, he (Philips) was discoursing upon pictures, and pitying the painters, who, in their historical pieces, always draw the same sort of *sky*. "They should travel (said he), and then they would see that there is a different *sky* in every country, in England, France, Italy, and so forth." "Your remark is just (said a grave gentleman who sat by), I have been a traveller, and can testify what you observe is true; but the greatest variety of *skies* that I found was in Poland." "In Poland, Sir? (says Philips)."

Philips. lips)." "Yes, in Poland; for there is *Bobieky*, and *Sabrunky*, and *Jablonky*, and *Podebrady*, and many more *skies*."

PHILIPS (Catharine), a very ingenious lady, the daughter of Mr John Fowler merchant, was born at London in January 1631, and educated at a school at Hackney. She married James Philips of the priory of Cardigan, Esq; and went with the viscountess of Dungannon into Ireland, where she translated Corneille's tragedy of Pompey into English, which was several times acted there with great applause.

She translated also the four first acts of Horace, another tragedy of Corneille, the fifth being done by Sir John Denham. This excellent and amiable lady, for such it seems she was, died of the smallpox in London, the 22d of June 1664, much and justly regretted; "having not left (says Langbaine) any of her sex her equal in poetry.—She not only equalled (adds he) all that is reported of the poetesses of antiquity, the Lesbian Sappho and the Roman Sulpitia, but justly found her admirers among the greatest poets of our age." Cowley wrote an ode upon her death. Dr Jeremy Taylor had addressed to her his "Measures and Offices of Friendship:" the second edition of which was printed in 1657, 12mo. She assumed the name of *Orinda*. In 1667, were printed, in folio, "Poems by the most deservedly admired Mrs Catharine Philips, the matchless *Orinda*. To which is added, Monsieur Corneille's Pompey and Horace, tragedies. With several other translations from the French;" and her picture before them, engraven by Faithorne. There was likewise another edition in 1678, folio; in the preface of which we are told, that "she wrote her familiar letters with great facility, in a very fair hand, and perfect orthography; and if they were collected with those excellent discourses she wrote on several subjects, they would make a volume much larger than that of her poems." In 1705, a small volume of her letters to Sir Charles Cottril were printed under the title of "Letters from *Orinda* to *Poliarchus*." The editor of these letters tells us, that "they were the effect of an happy intimacy between herself and the late famous *Poliarchus*, and are an admirable pattern for the pleasing correspondence of a virtuous friendship. They will sufficiently instruct us, how an intercourse of writing between persons of different sexes ought to be managed with delight and innocence; and teach the world not to load such a commerce with censure and detraction, when it is removed at such a distance from even the appearance of guilt."

PHILIPS (John), an eminent English poet, was born in 1676. He was educated at Winchester and Oxford, where he became acquainted with Milton, whom he studied with great application, and traced in all his successful translations from the ancients. The first poem which distinguished our author, was his *Splendid Shilling*, which is in the *Tatler* styled the *single burlesque poem in the English language*. His next was intitled *Blenheim*, which he wrote at the request of the earl of Oxford, and Mr Henry St John, afterwards Lord Bolingbroke, on the victory obtained there by the duke of Marlborough in 1704. It was published in 1705; and the year after he finished another poem upon cyder, the first book of which had been

written at Oxford. It is on the model of Virgil's *Georgics*, and is a very excellent piece. We have no more of Mr Philips but a Latin ode to Henry St John, Esq; which is esteemed a masterpiece. He was contriving greater things; but illness coming on, he was obliged to drop every thing but the care of his health. This care, however, did not save him: for, after lingering a long time, he died at Hereford, Feb. 15. 1708, of a consumption and asthma, before he had reached his 33d year. He was interred in the cathedral of that city with an inscription over his grave; and had a monument erected to his memory in Westminster-abbey by Sir Simon Harcourt, afterwards lord-chancellor, with an epitaph upon it written by Dr Atterbury, though commonly ascribed to Dr Freind. He was one of those few poets whose muse and manners were equally excellent and amiable; and both were so in a very eminent degree.

Dr Johnson observes, that "Philips has been always praised, without contradiction, as a man modest, blameless, and pious; who bore a narrow fortune without discontent, and tedious and painful maladies without impatience; beloved by those that knew him, but not ambitious to be known. He was probably not formed for a wide circle. His conversation is commended for its innocent gaiety, which seems to have flowed only among his intimates; for I have been told, that he was in company silent and barren, and employed only upon the pleasures of his pipe. His addiction to tobacco is mentioned by one of his biographers, who remarks, that in all his writings except *Blenheim* he has found an opportunity of celebrating the fragrant fume. In common life, he was probably one of those who please by not offending, and whose person was loved, because his writings were admired. He died honoured and lamented, before any part of his reputation had withered, and before his patron St John had disgraced him. His works are few. The *Splendid Shilling* has the uncommon merit of an original design, unless it may be thought precluded by the ancient *Centos*. To degrade the sounding words and stately construction of Milton, by an application to the lowliest and most trivial things, gratifies the mind with a momentary triumph over that grandeur which hitherto held its captives in admiration; the words and things are presented with a new appearance, and novelty is always grateful where it gives no pain. But the merit of such performances begins and ends with the first author. He that should again adapt Milton's phrase to the gross incidents of common life, and even adapt it with more art, which would not be difficult, must yet expect but a small part of the praise which Philips has obtained; he can only hope to be considered as the repeater of a jest.

"There is a Latin ode written to his patron St John, in return for a present of wine and tobacco, which cannot be passed without notice. It is gay and elegant, and exhibits several artful accommodations of classic expressions to new purposes. It seems better turned than the odes of Hannas. To the poem on cyder, written in imitation of the *Georgics*, may be given this peculiar praise, that it is grounded in truth; that the precept which it contains are exact and just, and that it is therefore at once a book of entertainment and of science. This I was told by Miller, the

Philips
Philistines.

great gardener and botanist, whose expression was, that 'there were many books written on the same subject in prose, which do not contain so much truth as that poem.' In the disposition of his matter, so as to intersperse precept, relating to the culture of trees, with sentiments more generally pleasing, and in easy and graceful transitions from one subject to another, he has very diligently imitated his master; but he unhappily pleased himself with blank verse, and supposed that the numbers of Milton, which impress the mind with veneration, combined as they are with subjects of inexcusable grandeur, could be sustained by images which at most can rise only to elegance. Contending angels may shake the regions of heaven in blank verse; but the flow of equal measures, and the embellishment of rhyme, must recommend to our attention the art of engraving, and decide the merit of the redibreak and pearmain. What study could confer, Philips had obtained; but natural deficiency cannot be supplied. He seems not born to greatness and elevation. He is never lofty, nor does he often surprise with unexpected excellence: but perhaps to his last poem may be applied what Tully said of the work of Lucretius, that 'it is written with much art, though with few blazes of genius.'

It deserves to be remarked, that there were two poets of both the names of our author, and who flourished in his time. One of them was Milton's nephew, and wrote several things, particularly some memoirs of his uncle, and part of *Virgil Traveltied*. The other was the author of two political farces, which were both printed in 1716: 1. *The Earl of Marr married*, with the *Humours of Jocky the Highlander*. 2. *The Pretender's Flight*; or a *Mock Coronation*, with the *Humours of the facetious Harry St John*.

PHILIPSBURG, is an imperial town of Germany, in the circle of the Upper Rhine. It is very strong, and looked upon as one of the bulwarks of the empire. It is seated in a morass, and fortified with seven bastions, and several advanced works. The town belongs to the bishop of Spire, but all the works and the fortifications to the empire. It has been several times taken and retaken, particularly by the French in 1734, when the duke of Berwick was killed at the siege; but it was rendered back the year following, in consequence of the treaty of Vienna. It is seated on the river Rhine, over which there is a bridge seven miles south of Spire, 22 south-east of Worms, and 40 north-east of Strasburg. E. Long. 8. 33. N. Lat. 49. 12.

PHILISTIA (anc. geog.), the country of the Philistines (Bible); which lay along the Mediterranean, from Joppa to the boundary of Egypt, and extending to inland places not far from the coast. *Palestini*, the people; *Palestina*, the country (Josephus): Afterwards applied to the whole of the Holy Land and its inhabitants. *Philisti*, the people (Septuagint); *Philistini* (Vulgate); the *Caphtorim* and *Philistim*, originally from Egypt, and descendants of Cham (Moses). Expelled and destroyed the Hivites the ancient inhabitants, and occupied their country; that is, the region which retained the name of *Philistim*, in which that of *Caphtorim* was swallowed up.

PHILISTINES, were the ancient inhabitants of Palestine, well known in sacred history. These people are sometimes called in Scripture *Cherethites* and *Caphtorim*.

torim. The earlier part of their history is, like that of most other nations, very obscure and uncertain. The authors of the Universal History tell us, that they were descended from the *Caphtorim*, both from the loins of Mizraim the son of Ham, the son of Noah. Moses tells us (*Deut. xi. 23*), that they drove out the *Avim* or *Avites* even to Azzah or Gazah, where they settled; but when this happened cannot be determined. On the whole, however, our learned authors are clearly of opinion, that the *Caphtorim* and *Caphtorim*, from whom the Philistines are descended, came originally from Egypt, and called the country which they had conquered by their own name (See *PALESTINE*). Many interpreters, however, think, that *Caphtor* was but another name for *Cappadocia*, which they imagine to have been the original country of the Philistines. But Father Calmet, in a particular dissertation prefixed to the first book of Samuel, endeavours to show that they were originally of the isle of Crete. The reasons which led him to think that *Caphtor* is the isle of Crete are as follow: The Philistines were strangers in Palestine, as appears in various parts of Scripture; such as *Gen. x. 14*. *Deut. ii. 23*. *Jer. xlvii. 4*. and *Amos ix. 7*. whence the Septuagint always translate this name *Strangers*. Their proper name was *Cherethims*, for *Ezekiel* (xxv. 16.), speaking against the Philistines, has these words, "I will stretch out mine hand upon the Philistines, and I will cut off the *Cherethims*, and destroy the remnant of the sea-coast." *Zephaniah* (ii. 5.), inveighing against the same people, says, "Wo unto the inhabitants of the sea-coasts, the nation of the *Cherethites*." And *Samuel* (Book I. xxx. 14.) says, that the *Amalekites* made an irruption into the country of the *Cherethites*, that is to say, of the Philistines, as the sequel of the discourse proves. And afterwards the kings of Judah had foreign guards called the *Cherethites* and *Peletites*, who were of the number of the Philistines (2 *Sam. xv. 18*.) The Septuagint, under the name *Cherethites*, understood the *Cretans*; and by *Cherith* they understood *Crete*. Besides the Scripture says, that the Philistines came from the isle of *Caphtor*. Now we see no island in the Mediterranean wherein the marks whereby the Scripture describes *Caphtor* and *Cherethim* agree better than in the isle of Crete. The name *Cretim* or *Cherethim* is the same with that of *Cretenses*. The *Cretans* are one of the most ancient and celebrated people which inhabited the islands of the Mediterranean. They pretended to have been produced originally out of their own soil. This island was well peopled in the time of the Trojan war. Homer calls it the island with a hundred cities. The city of Gaza in Palestine went by the name of *Minoa* (*Steph. Byzant. in Gaza*), because *Minos* king of Crete coming into that country, called this ancient city by his own name.

Herodotus acknowledges that the *Cretans* were originally all barbarians, and did not come from Greece. Homer says, that a different language was spoken in the isle of Crete; that there were Greeks there, true or ancient *Cretans*, *Pelasgians*, &c. The ancient *Cretans* are the same as the *Cherethites*, the *Pelasgians* as the *Philistines* or *Peletites* of the Scripture: their language was the same with that of the *Canaanites* or *Phoenicians*, that is, Hebrew: they were descended, as well

Philistines. well as Canaan, from Ham, by Mizraim (Gen. x. 6, 13, 14.) The manners, arms, religion, and gods of the Cretans and Philistines were the same. The arms of the one and the other were bows and arrows. Dagon the god of the Philistines was the same as the Dictynna of the Cretans.

Whether these arguments are convincing, it is not for us to determine; but Wells does not think they are, as he is of the same opinion with the authors of the Universal History, who say, that *Coptus*, the name of an old city of Egypt, is a corruption of the ancient *Caph-tor*. It is not, however, of great importance to determine whether they came from Crete, from Cappadocia, or from Egypt: they had certainly been a considerable time in the land of Canaan, when Abraham arrived there in the year of the world 2083. They were then a very powerful people, were governed by kings, and in possession of several considerable cities. The race of kings then in power were honoured with the title of *Abimelech*. This race, however, was but of short duration; for their monarchy became an aristocracy of five lords, who were, as far as we can discover, partly independent of each other, though they acted in concert for the common cause. This form of government was again succeeded by another race of kings, distinguished by the title of *Achish*, though they also bore that of *Abimelech*. The kings were always under great limitations. The Philistines appear to have been a very warlike people, industrious, and lovers of freedom; they did not circumcise, and in the early periods of their history held adultery in the greatest abhorrence. "Their character (say the authors of the Universal History) must be considered at different periods; for we may say they were not always the same people. In the days of Abraham and Isaac, they were without all doubt a righteous and hospitable nation: but afterwards a revolution in government, religion, and morals, may have ensued. From thenceforward they became like other idolatrous nations; the same enormities crept in and prevailed among them. They are constantly mentioned in Scripture as strangers; and, though possessed of a most considerable part of the Land of Promise, yet God would never suffer them to be driven out, they being Egyptians by descent, and not original natives, whose land only was promised to Abraham and his seed. Their arrogance and ambition were great; and so irreconcilable was their enmity (A) to the Israelites, that one would be almost tempted to think they were created on purpose to be a thorn in their sides; for though the hand of God was evidently against them several times, and particularly when they detained the ark, yet they hardened their hearts, and closed their eyes against conviction. They seem to have entertained a very fond veneration for their deities, in which they perished, tho'

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they were eye-witnesses of the shame and ignominy which befel them in the presence of the captive ark; nay, they were so biassed in their favour, as to imagine that their gods might prevail against Him who had in so glaring a manner put them to shame and disgrace. They were much addicted to trade; which, considering their situation, they may have exercised from the beginning; but, by the accession of the fugitive Edomites in David's time, they rose to so great a reputation as merchants, that the Greeks, it seems, preferred them to all other nations in that respect, and from them called all the country bordering on theirs *Palestine*. Their language was not so different from that spoken by the Hebrews as to cause any difficulty for them to converse together, as will be perceived by their intercourse with Abraham and Isaac; so that, in all this region, the several nations spoke one and the same tongue, perhaps with some variation of dialect. They had doubtless the arts and sciences in common with the most learned and ingenious among their contemporaries, and perhaps some of them in greater perfection. They had giants among them; but whether they were originally of the breed of the Anakims, who retired hither when they were expelled from Hebron, or were sprung from accidental births, is not easily determined. We must not forget, that the invention of the bow and arrow is ascribed to this people.

"Their religion was different at different times; under their first race of kings, they used the same rites with the Hebrews. Abimelech, in the sin he had like to have committed with Sarah, through Abraham's timidity, was favoured with a divine admonition from God; and, by his speech and behaviour at that time, it seems as if he had been used to converse with the Deity. In after-times, they erred into endless superstitions, and different kinds of idolatry; each of the principal or five cities seemed to have had an idol of its own. Marna, Marnas, or Marnash, was worshipped at Gaza, and is said to have migrated into Crete, and to have become the Cretan Jupiter. Dagon was worshipped at Azotus; he seems to have been the greatest, the most ancient, and most favourite god they had; to which may be added, that he perhaps subsisted the longest of any that did not straggle out of the country. To him they ascribed the invention of bread-corn, or of agriculture, as his name imports. We cannot enter into the common notion of his being represented as a monster, half man half fish; nor consequently into another almost as common, that he is the same with the Syrian goddesses Derceto, who, we are told, was represented under some such mixed form. Our opinion is, that this idol was in shape wholly like a man; for we read of his head, his hands, and his feet. He stood in a temple at Azotus, and had priests of his own who paid him a very constant attendance.

3 P

Next

(A) "From a passage in Chronicles, it is guessed to have been of very ancient date; where it is said, that 'the men of Gath slew the children of Ephraim, who would have taken their cattle from them.' This incident is nowhere else to be found; and there are various notions concerning the sense in which we must take this passage. As to the time of the transaction, most people allow it to have been while the children of Israel were sojourners in Egypt. It plainly appears, by the next verse, that Ephraim himself was living at that period. The Targum supposes his children miscalculated the time they were to serve in Egypt, and began too early an attempt upon their Promised Land."

Philistines Next to Dagon was Baalzebub the God of Ekron. In the text of the New Testament he is called *Beezelub*, and the *prince of devils*. His name is rendered *lord of flies*; which by some is held to be a mock appellation bestowed on him by the Jews; but others think him so styled by his worshippers, as Hercules Apomyios, and others, were, from his driving those insects away; and urge, that Ahaziah, in his sickness, would scarcely have applied to him, if his name had carried in it any reproach. But it must be remembered, it is the sacred historian that makes use of that contemptuous term in derision; whereas the idolatrous monarch, who was one of his votaries, might call him by his common name, supposed to have been *Baal zebaoth*, 'the lord of armies,' or *Baal shamim*, 'lord of heaven,' or some other bordering on Baal-zebub. How, or under what form he was represented, is uncertain: some place him on a throne, and attire him like a king; others paint him as a fly. Not to dwell on this obscurity, it appears that he became an oracle of the highest repute for omniscience and veracity; that he had priests of his own; and that he, in the middle times at least, was much sought after by those who were anxious about futurity. Derceto we take certainly to have been the goddess of Acalon; but we are supported by profane authority, without the least countenance from Scripture. Gath is seemingly the only city of all the five unprovided with a deity; wherefore, as the Scripture declares, that Ashtaroth, or Astarte, was worshipped by this people, we are ready to place her at Gath, and the rather, as this of all their cities may have had most communication with Sidon. To speak in general concerning their religious rites and ceremonies, which is all we can do, they seem to have erected very large and spacious temples, or very wide halls, for the celebration of their solemn seasons and festivals (for such they surely had); their religious offices were attended with much pomp, and a great concourse from all parts; and they presented their gods with the chief part of their spoil, and carried them about with them when they went to war. We do not find in Scripture that they sacrificed their children; and yet the Curetes (a) are said to be their descendants."

With respect to the history of this extraordinary people, we find from the above extract, that they were not comprehended in the number of nations devoted to extermination, and whose territory the Lord had abandoned to the Hebrews; nor were they of the cursed seed of Canaan. However, Joshua did not forbear to give their lands to the Hebrews, and to set upon them by command from the Lord, because they possessed a country which was promised to the people of God (Josh. xv. 45—47. and xiii. 2, 3.) But these conquests of Joshua must have been ill maintained, since under the Judges, under Saul, and at the beginning of the reign of David, the Philistines oppressed the Israelites. True it is, Shamgar, Samson, Samuel, and Saul, made head against them,

but did not reduce their power; and they continued independent down to the reign of David, who subjected them to his government.

They continued in subjection to the kings of Judah down to the reign of Jehoram, son of Jehoshaphat; that is, for about 246 years. However, Jehoram made war against them, and probably reduced them to his obedience again; because it is observed in Scripture, that they revolted again from Uzziah; and that this prince kept them to their duty during the time of his reign (2 Chr. xxi. 16. and xxvi. 6, 7.) During the unfortunate reign of Ahaz, the Philistines made great havoc in the territories of Judah; but his son and successor Hezekiah subdued them (2 Chr. xxviii. 18. and 2 Kings xviii. 8.) Lastly, they regained their full liberty under the latter kings of Judah; and we may see by the menaces denounced against them by the prophets Isaiah, Amos, Zephaniah, Jeremiah, and Ezekiel, that they brought a thousand hardships and calamities upon the children of Israel: for which cruelties God threatened to punish them. Elishaddon besieged Ashdod or Azoth, and took it (Isa. xx. 1.) And according to Herodotus, Psammeticus king of Egypt took the same city, after a siege of 29 years. There is great probability, that Nebuchadnezzar, when he subdued the Ammonites, Moabites, Egyptians, and other nations, bordering upon the Jews, reduced also the Philistines. After this, they fell under the dominion of the Persians; then under that of Alexander the Great, who destroyed the city of Gaza, the only city of Phœnicia that durst oppose him. After the persecution of Antiochus Epiphanes, the Asmonæans subjected under their obedience several cities of the Philistines; and Tryphon gave to Jonathan Maccabæus the government of the whole coast of the Mediterranean, from Tyre as far as Egypt, which included all the country of the Philistines.

PHILLYREA, MOCK-PRIVET; a genus of the monogynia order, belonging to the diandria class of plants. Each flower contains two males and one female. Some say there are seven species, all of them shrubby plants, and natives of France or Italy. Others reckon only three species, which are as follow:

1. *Phillyrea media*; the oval leaved phillyrea or mock privet, or the medial leaved phillyrea, a tall evergreen shrub, native of the south of Europe. 2. *Phillyrea latifolia*; the broad-leaved phillyrea or mock-privet, a tall evergreen shrub, native of the south of Europe. 3. *Phillyrea angustifolia*; the narrow-leaved phillyrea or mock-privet, a deciduous shrub, native of Spain and Italy.

1. The first has three varieties, viz. The first is the common smooth-leaved phillyrea. This plant grows to be 12 or 14 feet high, and the branches are very numerous. The older branches are covered with a dark brown bark, but the bark on the young shoots is of a fine green colour. They are oval, spear-shaped, and grow opposite, by pairs, on strong short footstalks.

The

(a) "The Curetes sacrificed their children to Saturn; and from the similitude this name bears to Chæthites or Philistines, it has been advanced that they are the same people; but as we have no warrant for saying the Philistines practised so barbarous and unnatural a custom, we may venture to pronounce, that they learned it not from them, but borrowed it elsewhere."

Phillyrea. The flowers are produced in clusters from the wings of the young branches. They are small, and of a kind of greenish-white colour; they appear in March, and are succeeded by berries, which are first green, then red, and black in the autumn when ripe. The second variety is the privet-leaved phillyrea, which grows to be 10 or 12 feet high, and the branches of which are covered with a brown bark. The leaves a little resemble the privet; they are of a fine green colour, and grow by pairs on the branches. They are of a lanceolate figure, and their edges are entire, or nearly so; for some signs of serratures sometimes appear. The flowers grow like others in clusters in March. They are whitish, and are succeeded by small black berries. The third variety, or the olive-leaved phillyrea, is the most beautiful of all the sorts. It will grow to be about 10 or 12 feet high; and the branches, which are not numerous, spread abroad in a free easy manner, which may not improperly be said to give the tree a fine air. They are long and slender, and are covered with a light brown bark; and on these the leaves stand opposite by pairs at proper intervals on short footstalks. They resemble those of the olive-tree, and are of so delightful a green as to force esteem. Their surface is exceeding smooth, their edges are entire, and the membrane of a thickish consistence. The flowers are small and white, and like the other sorts make no show. They are succeeded by single roundish berries.

2. The broad-leaved phillyrea will grow to be about 12 feet high. The branches seem to be produced stronger and more upright than those of the former species. The bark is of a grey colour, spotted with white, which has a pretty effect; and the leaves grow opposite by pairs. They are of a heart-shaped oval figure, of a thick consistence, and a strong dark-green colour. Their edges are sharply serrated, and they stand on short strong footstalks. The flowers grow from the wings of the leaves in clusters in March. They are of a kind of greenish-white colour, make no show, and are succeeded by small round black berries. There are also three varieties of this species, viz. the ilex-leaved phillyrea, the prickly phillyrea, and the olive phillyrea with slightly serrated edges.

3. The narrow-leaved phillyrea is of lower growth, seldom rising higher than 8 or 10 feet. The branches are few and slender, and they also are beautifully spotted with grey spots. The leaves, like the others, stand opposite by pairs. They are long and narrow, spear-shaped, and undivided, of a deep green colour, and of a thick consistence. Their edges are entire, and they also stand on short footstalks. The flowers, like the others, make no show. They are whitish, and grow in clusters from the wings of the branches, in March; and are succeeded by small round black berries. The varieties of this species are, the rosemary phillyrea, lavender phillyrea, striped phillyrea, &c.

This vegetable is to be propagated by seeds or layers. 1. By seeds. These ripen in the autumn, and should be sown soon after. The mould must be made fine; and if it is not naturally sandy, if some drift sand be added, it will be so much the better. The seeds for the most part remain until the second spring before they come up; and if they are not sown soon after they are ripe, some will come up even the third spring after. They must be sown about an inch deep; and

during the following summer should be kept clean from weeds. After they are come up, the same care must be observed, and also watering in dry weather; and if the beds are hooped, and the plants shaded in the hottest season, they will be so much the better for it. However, at the approach of winter they must be hooped, and the beds covered with mats in the hardest frosts, otherwise there will be danger of losing the whole crop; for these trees, though they are very hardy when grown tolerably large, are rather tender whilst seedlings. It will be proper to let them remain in the seed-beds with this management for two summers; and then waiting for the first autumnal rains, whether in September or October (and having prepared a spot of ground), they should at that juncture be planted out, and this will occasion them immediately to strike root. The distance they should be planted from each other need not be more than a foot, if they are not designed to remain long in the nursery. If there is a probability of their not being wanted for some years, they should be allowed near double that distance; and every winter the ground in the rows should be well dug, to break their roots, and cause them to put out fresh fibres, otherwise they will be in danger of being lost when brought into the shrubbery quarters. 2. By layers they will easily grow. The autumn is the best time for this operation, and the young shoots are fit for the purpose. The best way of layering them is by making a slit at the joint; though they will often grow well by a twist being only made. When the gardener chooses the method of twisting a young branch for the layers, he must be careful to twist it about a joint so as only to break the bark; for if it is too much twisted, it will die from that time, and his expectations wholly vanish. But if it be gently twisted with art and care, it will at the twisted parts be preparing to strike root, and by the autumn following, as well as those layers that had been slit, will have good roots; the strongest of which will be fit for planting where they are wanted to remain, whilst the weaker and worst-rooted layers may be planted in the nursery-ground like the seedlings, and treated accordingly.

PHILO, an ancient Greek writer, was of a noble family among the Jews, and flourished at Alexandria during the reign of Caligula. He was the chief of an embassy sent to Rome about the year 42, to plead the cause of the Jews against Apion, who was sent by the Alexandrians to charge them with neglecting the honours due to Cæsar. Caligula, however, would not allow him to speak, and behaved to him in such a manner that Philo was in considerable danger of losing his life. Others again tell us that he was heard; but that his demands were refused. He afterwards went to Rome in the reign of Claudius; and then, Eusebius and Jerome inform us, he became acquainted with St Peter, with whom he was on terms of friendship. Photius adds, that he became a Christian, and afterwards, from some motive of resentment, renounced it. Great part of this, however, is uncertain, for few believe that St Peter was at Rome so early as the reign of Claudius, if he ever was there at all.

Philo was educated at Alexandria, and made very great progress in eloquence and philosophy. After the fashion of the time, he cultivated, like many of his nation and faith, the philosophy of Plato, whose prin-

Philo-
tectes.

ciples he so thoroughly imbibed, and whose manner he so well imitated, that it became a common saying, "Aut Plato philonizat, aut Philo platonizat." Josephus says, he was a man "eminent on all accounts;" and Eusebius describes him, "copious in speech, rich in sentiments, and sublime in the knowledge of holy writ." He was, however, so much immersed in philosophy, particularly the Platonic, that he neglected the Hebrew language, and the rites and customs of his own people. Stricker says, that Philo "knew no more of Hebrew and Syriac than a Gaul or a Scythian." Grotius is of opinion, that "he is not fully to be depended on, in what relates to the manners of the Hebrews;" and Cudworth goes farther; for "though a Jew by nation (says he), he was yet very ignorant of Jewish customs." Fabricius thinks differently; for though he allows some inadvertencies and errors of Philo with regard to these matters, yet he does not see a sufficient foundation on which to charge so illustrious a doctor of the law with ignorance. He allows, however, that Philo's passion for philosophy had made him more than half a Pagan; for it led him to interpret the whole law and the prophets upon Platonic ideas; and to admit nothing as truly interpreted which was not agreeable to the principles of the academy. Besides, this led him farther; he turned every thing into allegory, and deduced the darkest meanings from the plainest words. This most pernicious practice ORIGEN, it is known, imitated, and exposed himself by it to the scoffs of Celsus and of Porphyry. Philo's writings abound with high and mystical, new and subtle, far-fetched and abstracted, notions; and indeed the doctrines of Plato and Moses are so promiscuously blended, that it is not an easy matter to assign to each his principles. There are certainly, however, in his works many excellent things. Though he is continually Platonising and allegorising the Scriptures, he abounds with fine sentiments and lessons of morality; and his morals are rather the morals of a Christian than of a Jew. History, together with his own writings, give us every reason to believe that he was a man of great prudence, constancy, and virtue.

His works were first published in Greek by Turnebus at Paris 1552. A Latin translation made by Gelenius was afterwards added, and printed several times with it. The Paris edition of 1640 in folio was the best for a whole century; which made Cotelerius say, that "Philo was an author that deserved to have a better text and a better version." In 1742, a handsome edition of his work was published at London by Dr Mangey in two volumes folio; which is certainly preferable if it were only for the paper and print, but it is not so good a one as Philo deserves.

Many of our readers may be desirous of further details respecting this celebrated man; we refer such therefore to *Josephus's Antiquities*, *Eusebius's Ecclesiastical History*, St Jerome's work *De Scripturis Ecclesiasticis*, *Fabricius Bibl. Græc. Cave Hist. Liter.* and Vol. II. of *Monuments of the Greek Church*.

PHILOCTETES, an admiral of the Athenian fleet during the Peloponnesian war. He recommended to his countrymen to cut off the right hand of such of

the enemies as were taken, that they might be rendered unfit for service. His plan was adopted by all the ten admirals except one; but their expectations were frustrated, and instead of being conquerors they were totally defeated at Ægospotamos by Lysander, and Philoctetes was put to death with the rest of his colleagues.

PHILOCTETES, in fabulous history, the son of Pean, was the fatal companion of Hercules; who at his death obliged him to swear not to discover the place where his ashes were interred, and presented him with his arrows dipped in the Hydra's blood. The Greeks at the siege of Troy being informed by an oracle that they could never take that city without their fatal arrows, went to Philoctetes, and insisted upon his discovering where he had left his friend; when Philoctetes, to evade the guilt of perjury, let them know where Hercules was intombed, by stamping upon the place; but he was punished for the violation of his oath, by dropping an arrow upon that foot; which, after giving him great agony, was at length cured by Mædon. He was afterwards taken by Ulysses to the siege of Troy, where he killed Paris with one of his arrows.

PHILOLAUS, of Crotona, was a celebrated philosopher of antiquity, of the school of Pythagoras, to whom that philosopher's *Golden Verses* have been ascribed. He made the heavens his principal object of contemplation; and has been idly (Δ) supposed to have been the author of that true system of the world which Copernicus afterwards revived. This made Bullialdus place the name of Philolaus at the head of two works, written to illustrate and confirm that system.

"He was (says Dr Enfield) a disciple of Archytas, and flourished in the time of Plato. It was from him that Plato purchased the written records of the Pythagorean system, contrary to an express oath taken by the society of Pythagoreans, pledging themselves to keep secret the mysteries of their sect. It is probable, that among these books were the writings of Timæus, upon which Plato formed the dialogue which bore his name. Plutarch relates, that Philolaus was one of the persons who escaped from the house which was burned by Cylon, during the life of Pythagoras; but this account cannot be correct. Philolaus was contemporary with Plato, and therefore certainly not with Pythagoras. Interfering in affairs of state, he fell a sacrifice to political jealousy.

"Philolaus treated the doctrine of nature with great subtlety, but at the same time with great obscurity; referring every thing that exists to mathematical principles. He taught, that reason, improved by mathematical learning, is alone capable of judging concerning the nature of things; that the whole world consists of infinite and finite; that number subsists by itself, and is the chain which by its power sustains the eternal frame of things; that the Monad is not the sole principle of all things, but that the Binary is necessary to furnish materials from which all subsequent numbers may be produced; that the world is one whole, which has a fiery centre, about which the ten celestial spheres revolve, heaven, the sun, the planets, the

Philo-
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His
Philosophy.

(Δ) We say idly, because there is undoubted evidence that Pythagoras learned that system in Egypt. See PHILOSOPHY.

Philolaus the earth, and the moon; that the sun has a vitreous surface, whence the fire diffused through the world is reflected, rendering the mirror from which it is reflected visible; that all things are preserved in harmony by the law of necessity; and that the world is liable to destruction both by fire and by water. From this

summary of the doctrine of Philolaus it appears probable, that, following Timæus, whose writings he possessed, he so far departed from the Pythagorean system as to conceive two independent principles in nature, God and Matter, and that it was from the same source that Plato derived his doctrine upon this subject."

Philolaus.

P H I L O L O G Y.

1 definition.

PHILOLOGY is compounded of the two Greek words *φιλος* and *λογος*, and imports "the desire of investigating the properties and affections of words." The natives of Greece were, in the most ancient times, denominated *σοφοι*, that is, *wise men*. Pythagoras renounced this pompous appellation, and assumed the more humble title of *σοφιστής*, that is, *a lover of wise men*. The learned Greeks were afterwards called *φιλοσοφοι*; and in process of time, in imitation of this epithet, the word *philologist* was adopted, to import "a man deeply versed in languages, etymology, antiquities, &c." Hence the term *philology*, which denotes the science that we propose briefly to discuss in the following article.

2 Objects and scope of philology.

Though philology, in its original import, denoted only the study of words and language, it gradually acquired a much more extensive, and at the same time a much more useful, as well as more exalted, signification. It comprehended the study of grammar, criticism, etymology, the interpretation of ancient authors, antiquities; and, in a word, every thing relating to ancient manners, laws, religion, government, language, &c. In this enlarged sense of the word, philology becomes a science of the greatest utility; opens a wide field of intellectual investigation; and indeed calls for a more intense exertion of industry, and multifarious erudition, than most of those departments of literature which custom hath dignified with more high-sounding names. It is indeed apparent, that, without the aid of philological studies, it is impossible, upon many occasions, to develop the origin of nations; to trace their primary frame and constitution; to discover their manners, customs, laws, religion, government, language, progress in arts and arms; or to learn by what men and what measures the most celebrated states of antiquity rose into grandeur and consideration. The study of history, so eminently useful to the legislator, the divine, the military man, the lawyer, the philosopher, and the private gentleman who wishes to employ his learned leisure in a manner honourable and improving to himself, and useful to his country, will contribute very little towards enlightening the mind without the aid of philological researches. For these reasons we shall endeavour to explain the various branches of that useful science as fully and as intelligibly as the nature of the present undertaking will permit.

3 Obj. of this article.

Most of the branches of philology have been already canvassed under the various head of CRITICISM, ETYMOLOGY, GRAMMAR, LANGUAGE, &c. There still remains one part, which has been either slightly touched upon, or totally omitted, under the foregoing topics: we mean, the nature and complexion of most of the oriental tongues; as also some of the radical dialects of the languages of the west. As we would willingly

gratify our readers of every description to the utmost of our power, we shall endeavour in this place to communicate to them as much information upon that subject as the extent of our reading, and the limits prescribed one single article, will permit.

Before we enter upon this subject, we must observe, that it is not our intention to fill our pages with a tedious, uninteresting, catalogue of barbarous languages, spoken by savage and inconsiderable tribes, of which little, or perhaps nothing, more is known than barely their names. Such an enumeration would swell the article without communicating one single new idea to the reader's antecedent stock. We shall therefore confine our inquiries to such languages as have been used by considerable states and societies, and which of consequence have acquired a high degree of celebrity in the regions of the east.

What was the antediluvian language, or whether it was divided into a variety of dialects as at this day, can only be determined by the rules of analogy; and these will lead us to believe, that whatever might have been the primitive language of mankind, if human nature was then constituted as it is at present, a great variety of dialects must of necessity have sprung up in the space of near 2000 years. If we adopt the Mosiac account of the antediluvian events, we must admit that the descendants of Cain for some ages lived separated from those of Seth. Their manner of life, their religious ceremonies, their laws, their form of government, were probably different, and these circumstances would of course produce a variety in their language. The posterity of Cain were an inventive race. They found out the art of metallurgy, music, and some think of weaving; and in all probability many other articles conducive to the ease and accommodation of life were the produce of their ingenuity. A people of this character must have paid no small regard to their words and modes of expression. Wherever music is cultivated, language will naturally be improved and refined. When new inventions are introduced, a new race of words and phrases of necessity spring up, corresponding to the recent stock of ideas to be intimated. Besides, among an inventive race of people, new vocables would be continually fabricated, in order to supply the deficiencies of the primitive language, which was probably scanty in words, and its phraseology unpolished. The Canites, then, among their other improvements, cannot well be supposed to have neglected the cultivation of language.

Many conjectures have been hazarded both by ancient and modern authors with respect to the origin of writing; an art nearly connected with that of speaking. According to Pliny*, "the Assyrian letters had a divine origin; some imagined that letters had been invented

4 Variety of dialects before the deluge.

5 Where, especially among the children of Cain.

History of
6
Origin of
writing.

vented by the Egyptian Mercury; others ascribed the honour of the invention to the Syrians." The truth seems to be, that letters were an antediluvian invention, preserved among the Chaldeans or Assyrians, who were the immediate descendants of Noah, and inhabited those very regions in the neighbourhood of which the ark rested, and where that patriarch afterwards fixed his residence. This circumstance, we think, affords a strong presumption that the use of letters was known before the deluge, and transmitted to the Assyrians and Chaldeans by Noah their progenitor, or at least by their immediate ancestors of his family. If, then, the art of writing was an antediluvian invention, we think that in all probability it originated among the posterity of Cain.

The descendants of Seth, according to the oriental tradition, were chiefly addicted to agriculture and tending of cattle. They devoted a great part of their time to the exercises of piety and devotion. From this circumstance they came to be distinguished by the title of the (A) *sons of God*. According to this description, the Sethites were a simple (B), unimproved race of people till they mingled with the race of Cain; after which period they at once adopted the improvements and the vices of that wicked family.

It is not, however, probable, that all the descendants of Seth, without exception, mingled with the Cainites. That family of which Noah was descended had not incorporated with the race of Cain: it was, according to the sacred historian, lineally descended from Seth, and had preserved the worship of the true God, when, it is probable, the greatest part of mankind had apostatised and become idolaters (C). Along with the true religion, the progenitors of Noah had preserved that simplicity of manners and equability of character which had distinguished their remote ancestors. Agriculture and rearing cattle had been their favourite occupations. Accordingly we find, that the patriarch Noah, immediately "after the deluge," became a husbandman, and "planted a vineyard." The chosen patriarchs, who doubtless imitated their pious ancestors, were shepherds, and employed in rearing and tending cattle. Indeed there are strong presumptions that the Chaldeans, Assyrians, Syrians, Canaanites, and Arabians, in the earliest ages followed the same profession.

From this deduction, we imagine it is at least probable, that the ancestors of Noah persisted in the observance of the same simplicity of manners which had

been handed down from Adam to Seth, and from him to Enoch, Methuselah, Lamech, and from this last to Noah. According both to scripture and tradition, innovations were the province of the Cainites, while the descendants of Seth adhered to the primitive and truly patriarchal institutions.

If these premises are allowed the merit of probability, we may justly infer that the language of Noah, whatever it was, differed very little from that of Adam (D); and that it is possible to ascertain the language of the former, that of the latter will of course be discovered. We shall then proceed to throw together a few observations relating to the language of Noah, and leave our readers to judge for themselves. We believe it will be superfluous to suggest, that our intention in the course of this deduction, is, if possible, to trace the origin and antiquity of the Hebrew tongue; and to try to discover whether that language, or any of its sister dialects, may claim the honour of being the original language of mankind.

Whatever may have been the dialect of Noah and his family, that same dialect, according to the Mosaic account, must have obtained, without any alteration, till the era of the building of the tower of Babel.—Upon this occasion a dreadful convulsion took place: the language of mankind was confounded, and men were scattered abroad upon the face of all the earth.

How far this catastrophe (E) extended, is not the business of the present inquiry to determine. One thing is certain beyond all controversy, namely, that the languages of all the nations which settled near the centre of population were but slightly affected by its influence. A very judicious writer has observed *, that 3000 years after, the inhabitants of those countries exhibited a very strong resemblance of cognation, "in their language, manner of living, and the lineaments of their bodies." At the same time he observes, that the resemblance in all those particulars was most remarkable among the inhabitants of Mesopotamia." This observation, with respect to language, will, we doubt not, be vouched by every one of our readers who has acquired even a superficial knowledge of the languages current in those quarters, at a very early period.

It appears, then, that the languages of the Armenians, Syrians, Assyrians, Arabians, and probably of the Chanaanim, did not suffer materially by the confusion of tongues. This observation may, we imagine, be extended to many of the dialects (F) spoken by the people who settled in those countries not far distant

(A) From this passage (Gen. ch. vi. ver. 2.) misunderstood, originated the absurd idea of the connection between angels and mortal women. See *Joseph. Antiq. Jud.* l. 1. cap. 4. See *Euseb. Chron.* lib. 1. All the fathers of the church, almost without exception, adopted this foolish notion. See also *Philo. Jud.* p. 198. ed. Turn, Paris 1552.

(B) The orientals, however, affirm that Seth, whom they call *Edris*, was the inventor of astronomy.

(C) We think it highly probable that idolatry was established before the flood; because it prevailed almost immediately after that catastrophe. See *POLYTHEISM*.

(D) For the first language communicated to Adam, see the article on *LANGUAGE*; also *Shenckford's Connect.* Vol. I. l. ii. p. 111. *et seq.*

(E) Josephus and the fathers of the church tell us, that the number of languages produced by the confusion of tongues was 72; but this is a mere rabbinical legend.

(F) The languages of the Medes, Persians, Phœnicians, and Egyptians, very much resembled each other in their original complexion; and all had a strong affinity to the Hebrew, Chaldean, Syriac, &c. See *Walton's Proleg.*

History of flant from the region where the sacred historian has fixed the original seat of mankind after the deluge. The inference then is, that if Noah and his family spoke the original language of Adam, as they most probably did, the judgment which affected the confusion of tongues did not produce any considerable alteration in the language of such of the descendants of Noah as settled near the region where that patriarch had fixed his residence after he quitted the ark.

9 Only a part of mankind engaged in building the tower, But supposing the changes of language produced by the catastrophe at the building of the tower as considerable as has ever been imagined, it does not, after all, appear certain that all mankind without exception were engaged in this impious project. If this assertion should be well founded, the consequence will be, that there was a chosen race who did not engage in that enterprise. If there was such a family, society, or body of men, it will follow, that this family, society, &c. retained the language of its great ancestor without change or variation. That such a family did actually exist, is highly probable, for the following reasons:

1. We think there is reason to believe, that Ham, upon the heavy curse denounced upon him by his father \ddagger , retired from his brethren, and fixed his residence elsewhere. Accordingly, we find his descendants scattered far and wide, at a very great distance from the Gordyean mountains, where the ark is generally supposed to have rested immediately after the flood. Some of them we find in Chaldea, others in Arabia Felix, others in Ethiopia (c), others in Canaan, and others in Egypt; and, finally, multitudes scattered over all the coast of Africa. Between those countries were planted many colonies of Shemites, in Elam, Assyria, Syria, Arabia, &c. We find, at the same time, the descendants of Shem and Japheth settled, in a great degree, contiguous to each other. This dispersion of the Hamites, irregular as it is, can scarce, we think, have been accidental; it must have been owing to some uncommon cause, and none seems more probable than that assigned above. If, then, the descendants of Ham separated early, and took different routs, as from their posterior situations it appears they did, they could not all be present at the building of the tower.

2. It is not probable that the descendants of Shem were engaged in this undertaking, since we find that they were not scattered abroad upon the face of all the earth. The children of Shem were \parallel Elam, Ashur, Arphaxad, Lud, and Aram. Elam settled near the mouth of the river Tigris, in the country which, by

Gentile writers, was called *Elymais*. Above him, on the same river, by the demelne of Ashur on the western side. In like manner, upon the same river, above him was situated Aram, who possessed the country of Aramea; and opposite to him was Arphaxad, or Arbaces or Arbaches, and his country was denominated *Arphachitis*. Lud, as some think, settled in Lydia, among the sons of Japheth; but this opinion seems to be without foundation (H). Here, then, there is dispersion, but such as must have originated from the nature of the thing. The four, or rather the five, brothers, all settled contiguous, without being scattered abroad upon the face of the whole earth. Besides, there was no confusion of language among these tribes: they continued to use one and the same *lip* through many succeeding generations.

From these circumstances, it appears that the posterity of Shem were not involved in the guilt of the builders of the tower, and of consequence did not undergo their punishment. If, then, the language of the Shemites was not confounded upon the erection of the tower, the presumption is, that they retained the language of Noah, which, in all probability, was that of Adam. Some dialectical differences would in process of time creep in, but the radical fabric of the language would remain unaltered.

3. The posterity of Shem appear in general to have cultivated the pastoral life. They imitated the style of living adopted by the antediluvian posterity of Seth. No sooner had Noah descended from the ark, than he became *ish ba Adamah*, a man of the earth; that is, a husbandman, and planted a vineyard. We find that some ages after, Laban the Syrian had flocks and herds; and that the chief wealth of the patriarch Abraham and his children consisted in their flocks and herds. Even his Gentile descendants, the Ishmaelites and Midianites, seem to have followed the same occupation. But people of this profession are seldom given to changes: their wants are few, and of consequence they are under few or no temptations to deviate from the beaten track. This circumstance renders it probable, that the language of Noah, the same with that of Adam, was preserved with little variation among the descendants of Arphaxad down to Abraham.

We have observed above, that Ham upon the curse denounced against him by his father, very probably left the society of his other brothers, and emigrated elsewhere, as Cain had done in the antediluvian world. There is a tradition still current in the East, and which was adopted by many of the Christian fathers (1), that Noah, in the 930th year of his life, by divine appointment,

Proleg.; Gale's *Court of the Gent.* vol. 1. l. 1. ch. 11. page 70. *et seq.*; Boch. *Phalee* and *Chanaan pass.* To these we may add the Greek language, as will appear more fully below.

(c) Josephus informs us, that all the nations of Asia called the Ethiopians *Cushim*, l. 1. cap. 7.

(H) The ancient name of Lydia was *Mæonia*. See Strabo *Casab.* l. 13. page 586. chap. 7. *Rhod.* 577. The Lydians were celebrated for inventing games; on which account they were nicknamed by the Æolian Greeks *Λυδοι*, *Lydi* or *Ludi*, from the Hebrew words *lutz*, *ludere*, *illudere*, *deridere*. We find (Ezek. chap. xxvii. ver. 10.) the men of Elam and the men of Lud joined in the defence of Tyre; which seems to intimate, that the Elamites and Ludim were neighbours. If this was actually the case, then Lud settled in the same quarter with his brothers.

(1) *Epiph.* vol. i. pag. 5. *ibid.* pag. 709. where our learned readers will observe some palpable errors about *Rhinocorura*, &c. Euseb. *Chron.* pag. 10. Syncellus, pag. 89. Cedrenus, *Chron. Pasch.* &c.

History of

ment, did, in the most formal manner, divide the whole terraqueous globe among his three sons, obliging them to take an oath that they would stand by the decision. Upon this happened a migration at the birth of Peleg, that is, about three centuries after the flood. It is affirmed, that Nimrod the arch-rebel disregarded this partition, and encroached upon the territory of Ashur, which occasioned the first war after the flood.

Calymene
Ham.
Hom. Iliad
lib. xv.

The Greeks had acquired some idea of this partition, which they supposed to have been between Jupiter, Neptune, and Pluto. Plato seems to have heard of it (κ): For (says he) the gods of old obtained the dominion of the whole earth, according to their different allotments. This was effected without any contention, for they took possession of their several provinces in a fair and amicable way, by lot."

Ant. Jud.
lib. i. c. 5.

Jacobus, in his account of the dispersion of mankind, plainly intimates a divine destination; and Philo Judeus (L) was of the same opinion before him.

In consequence of this arrangement, the sons of Shem possessed themselves of the countries mentioned in the preceding pages: the posterity of Japhet had spread themselves towards the north and west; but the Hamites, who had separated from their brethren in consequence of the curse, not choosing to retire to their quarters, which were indeed very distant from the place where the ark rested, seized upon the land of Canaan (M). Perhaps, too, it might be suggested by some malicious spirits, that the aged patriarch was dealing partially, when he assigned Ham and his posterity a quarter of the world to inhabit not only remote from the centre of population, but likewise sequestered from the rest of mankind (N).

Be that as it may, the children of Ham removed eastward, and at length descending from the Carduchean or Gordyæan mountains, directed their course westward, and arrived at the plains of Shinar, which had been possessed by the Assyrians ever since the era of the first migration at the birth of Peleg. The sacred historian informs us, that the whole earth "was of one language and of one speech;" that in journeying from the east, they lighted upon the plain of Shinar, and dwelt there. In this passage we find no particular people specified; but as we find Nimrod,

one of the descendants of Ham, settled in that country, we are sure that they were the offspring of that patriarch. It would not, we think, be easy to assign a reason how one branch of the family of Ham came to plant itself in the midst of the sons of Shem by any other means but by violence.

It is indeed generally supposed, that Nimrod, at the head of a body of the children of Ham, made war upon Ashur, and drove him out of the country of Shinar; and there laid the foundation of that kingdom, the beginning of which was Babel: that this chief, supported by all the Cushites, and a great number of apostates from the family of Shem and Japhet who had joined him, refused to submit to the divine ordinance by the mouth of Noah, with respect to the partition of the earth; and that he and his adherents were the people who erected the celebrated tower, in consequence of a resolution which they had formed to keep together, without repairing to the quarters assigned them by the determination of Heaven. This was the crime which brought down the judgment of the Almighty upon them, by which they were scattered abroad upon the face of the earth. The main body of the children of Shem and Japhet were not engaged in this impious undertaking; their language, therefore, was not confounded, nor were they themselves scattered abroad. Their habitations were contiguous; those of the Shemites towards the centre of Asia; the dwellings of Japhet were extended towards the north and north-west; and the languages of both these families continued for many ages without the least variation, except what time, climate, laws, religion, new inventions, arts, sciences, and commerce, &c. will produce in every tongue in a succession of years.

The general opinion then was, that none but the progeny of Ham and their associates were present at the building of the tower, and that they only suffered by the judgment (O) consequent upon that attempt. There are even among the Pagans some allusions to the division of the world among the three sons of Noah. Many of the learned have imagined that this patriarch was Saturn; and that his three sons were Jupiter, Neptune, and Pluto, as has been observed above.

Bero-

(κ) Critias, vol. 3. pag. 129. *Serr.* Apollodorus mentions a time when the gods respectively selected particular cities and regions, which they were to take under their peculiar protection.

(L) *L. 10. p. 236. Turn. Paris 1552.* We have a plain allusion to this distribution (*Deut. ch. xxxii. ver. 7.*) "When the most High divided to the nations their inheritance, when he separated the sons of Adam, he sets the bounds of the people, according to the number of the children of Israel; for the Lord's portion is his people; Jacob is the lot of his inheritance." From this passage it appears, that the whole was arranged by the appointment of God, and that the land of Canaan was expressly reserved for the children of Israel. St Paul, *Acts ch. xvii. ver. 26.* speaks of this divine arrangement, "God made of one blood all nations of men, for to dwell on all the face of the earth; and determined the bounds of their habitation."

(M) The ark, according to the most probable accounts, rested upon mount Ararat in Armenia.

(N) We think it is by no means improbable that Noah, well knowing the wickedness of the family of Ham, and especially their inclination to the idolatry of the antediluvians, might actually intend to separate them from the rest of mankind.

(O) Some learned men have imagined that this confusion of language, which the Hebrew calls of *Lip*, was only a temporary failure of pronunciation, which was afterwards removed. This they are led to conclude, from the agreement of the languages of these people in after times.

History of Berofus*, in his history of the Babylonians, informs us, that Noah, at the foot of Mount Baris or Luban, where the ark rested, gave his children their last instructions, and then vanished out of sight. It is now generally believed that the Xithrusus of Berofus was Noah. Eupolemus†, another Heathen writer, tells us, "that the city Babel was first founded, and afterwards the celebrated tower; both which were built by some of those people who escaped the deluge. They were the same with those who in after times were exhibited under the name of *giants*. The tower was at length ruined by the hand of the Almighty, and those giants were scattered over the whole earth." This quotation plainly intimates, that according to the opinion of the author, only the rascally mob of the Hamites, and their apostate associates, were engaged in this daring enterprize.

Indeed it can never be supposed that Shem, if he was alive at that period, as he certainly was, would co-operate in such an absurd and impious undertaking. That devout patriarch, we think, would rather employ his influence and authority to divert his descendants from an attempt which he knew was undertaken in contradiction to an express ordinance of Heaven: and it is surely very little probable that Elam, Ashur, Arphaxad, and Aram, would join that impious confederacy, in opposition to the remonstrances of their father.

The building of the tower, according to the most probable chronology, was undertaken at a period so late, that *all mankind* could not possibly have concurred in the enterprize.

Many of the fathers were of opinion, that Noah settled in Armenia, the country where the ark rested; and that his descendants did not leave that region for five generations‡, during the space of 659 years. By this period the human race must have been so amazingly multiplied, that the plains of Shinar could not have contained them. According to the Samaritan Pentateuch, and the Septuagint version, Peleg was born in the 134th year of his father Eber. Even admitting the vulgar opinion, that the tower was begun to be built, and the dispersion consequent upon that event to have taken place at this era, the human race would have been by much too numerous to have universally concurred in one design.

From these circumstances, we hope it appears that the whole mass of mankind was not engaged in building the tower; that the language of all the human race was not confounded upon that occasion; and that the dispersion reached only to a combination of Hamites, and of the most profligate part of the two other families, who had joined their wicked confederacy.

* Vol. XIV. Part II.

We have pursued this argument to considerable length, because some have inferred, from the difference in languages existing at this day, that mankind cannot have sprung from two individuals; because, from the connection still existing among languages, some have been bold enough to question the fact, though plainly recorded in sacred history; and lastly, because we imagine that some of our readers, who do not pretend to peruse the writings of the learned, may be gratified by seeing the various opinions respecting the confusion of tongues, and the dispersion of mankind, collected into one mass, equally brief, we hope, and intelligible: and this view of these opinions, with the foundations on which they respectively rest, we think may suffice to prove, that the language of Noah was for some ages preserved unmixed among the descendants of both Shem and Japhet.

To gratify still farther such of our curious readers as may not have access to more ample information, we shall in this place exhibit a brief detail of the circumstances which attended this fatal attempt. The people engaged in it have been held up as a profligate race. The Almighty himself denominates them "*the children of men*," which is the very appellation by which the antediluvian sinners were characterized; *the sons of God saw the daughters of men*, &c. Their design in raising this edifice was "*to make them a name*, and to prevent their being scattered abroad upon the face of the whole earth*."

* Gen. chap. ix.

Whatever resolution the rest of mankind might take, they had determined to maintain themselves on that spot. The tower was intended as a centre of union, and perhaps as a fortress of defence. Such a stupendous fabric, they imagined, would immortalize their memory, and transmit the name of their confederacy with eclat (p) to future ages. This design plainly intimates, that there was only a party concerned in the undertaking, since, had all mankind been engaged in it, the purpose would have been foolish and futile. Again, they intended, by making themselves a name, to prevent their being scattered abroad upon the face of the earth. This was an act of rebellion in direct contradiction to the divine appointment, which constituted their crime, and brought down the judgment of Heaven upon their guilty heads. The consequence of the confusion of languages was, that the projectors left off to build (q), and were actually scattered abroad, contrary to their intention.

Abydenus, in his Assyrian annals, records, that the tower was carried up to heaven; but that the gods ruined it by storms and whirlwinds, and overthrew it upon the heads of those who were employed in the work, and that the ruins of it were called Babel.

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(p) Many foolish and absurd notions have been entertained concerning this structure. Some have imagined that they meant to take shelter there in case of a second deluge; others, that it was intended for idolatrous purposes; others, that it was to be employed as an observatory. Its dimensions have likewise been most extravagantly magnified. Indeed Strabo, l. i6. mentions a tower of immense size remaining at Babylon in his time, the dimensions of which were a stadium every way. This, however, seems to have been the remains of the temple of Bel or Belus.

(q) For a description of the tower, see the article BABEL.

(r) See the Greek original of this quotation, Euseb. Chron. lib. i. page 10.

History of *Islen*. Before this there was but one language subsisting among men: but now there arose *Nimrod*, a mighty hunter; and he adds, that a war soon after broke out between (s) Titan and Cronus." (t) The Sybilline oracles give much the same account of this early and important transfection.

* Philip.
1b. 18.
cap. 3.

"Justin * informs us, that the Phœnicians who built Tyre were driven from Assyria by an earthquake. These Phœnicians were the descendants of Mizraim the youngest son of Ham; and were, we think, confederates in building the tower, and were driven away by the catastrophe that ensued. Many other allusions to the dispersion of this branch of the family occur in Pagan authors, which the limits to be observed in an inquiry of this nature oblige us to omit. Upon the whole, we think it probable that the country of Shinar lay desolate for some time after this revolution; for the dread of the judgment inflicted upon the original inhabitants would deter men from settling in that insubstantial region. At last, however, a new colony arrived, and Babel, or Babylon, became the capital of a flourishing kingdom.

+ P. 10.
Ph. 1.
cap. 10.

Our readers, we believe, will expect that we should say something of Nimrod the mighty hunter, who is generally thought to have been deeply concerned in the transactions of this period. According to most authors, both ancient and modern, this patriarch was the leader of the confederates who erected the tower, and the chief instigator to that enterprize. But if the tower was built at the birth of Pheleg, according to the Hebrew computation, that chief was† either a child, or rather not born at that period (v). The Seventy have pronounced him a giant, as well as a huntman. They have translated the Hebrew word *gêbur*, which generally signifies *strong, mighty*, by the word *giant*; an idea which we imagine those translators borrowed from the Greeks. The antediluvian giants are called *Nephelim* and *Rephaim*, but never *Gêburim*. The Rabbinical writers, who justly hated the Babylonians, readily adopted this idea (x); and the fathers of the church, and the Byzantine historians, have universally followed them. He has been called *Nimrod*, *Nymbroth*, *Nebroth*, and *Nelris*. Not a few have made him the first *Bacchus*, and compounded his name of *Bar*, a son, and *Cush*, that is, the son of Cush. Some have imagined that he was the Orion of the Pagans, whose shade is so nobly detested by Homer ‡. But the etymology of this last name implies something (y) honourable, and very unsuitable to the idea of the tyrant *Nimrod*. It must be observed, however,

§ 10. 1.
ver. 57.

that we find nothing in Scripture to warrant the supposition of his having been a tyrant; so far from it, that (z) some have deemed him a benefactor to mankind. See NIMROD.

The beginning of this prince's kingdom was Babel. Eusebius gives us first * a catalogue of six kings of the Chaldeans, and then another of five kings of Arabian extraction, who reigned in Chaldea after them. This might naturally enough happen, since it appears that the inhabitants of those parts of Arabia which are adjacent to Chaldea were actually Cushites, of the same family with the Babylonians.

† Gen. x.
Ezek. xlvii.

The Cushites, however, were at last subdued, perhaps partly expelled Chaldea by the *Chasidim*, who probably claimed that territory as the patrimony of their progenitors. That the *Chasidim* were neither *Cushites*, nor indeed *Hamites*, is obvious from the name. The Hebrews, and indeed all the Orientals‡, denominated both the people who inhabited the eastern coast of Arabia *Cushim*, and also the Ethiopians who sprung from the last mentioned people. Had the later inhabitants of Chaldea been the descendants of Cush, the Jewish writers would have called them *Cushim*. We find they called the Phœnicians *Chanaanim*, the Syrians *Aramim*, the Egyptians *Mizraim*, the Greeks *Jonim*, &c. The *Chasidim*, therefore, or modern inhabitants of Chaldea, were positively descended of one *Chesed* or *Chafed*; but who this family-chief was, it is not easy to determine. The only person of that name whom we meet with in early times is the fourth son of Nahor§, the brother of Abraham; and some have been of opinion that the Chaldeans were the progeny of this same *Chesed*. This appears to us highly probable, because both Abram and Nahor were natives of *Ur* of the Chaldeans. The former, we know, in consequence of the divine command, removed to *Haran*, afterwards *Urra*; but the latter remained in *Ur*, where his family multiplied, and, in process of time, became masters of the country which they called the land of the *Chasidim*, from *Chesed* or *Chafed*, the name of their ancestor. This account is the more probable, as we find the other branches of Nahor's family settled in the same neighbourhood (A).

§ Gen.
chap. xliii.
ver. 22.

¶ Gen.
chap. x.
verse 25.

How the Greeks came to denominate these people *Chaldei*, is a question rather difficult to be resolved; but we know that they always affected to distinguish people and places by names derived from their own language. They knew a rugged, erratic nation (B) on the banks of the river *Thermodon*, in the territory of Pontus, bordering on Armenia the

16
Origin of
the name
Chaldei.

Less

(s) This war was probably carried on between the leaders of the Hamites and Ashur upon their invasion.
(t) Theoph. ad Antol. l. 2. page 107. ed. Paris 1636.
(v) Gen. chap. 10. verse 8, 9. "This man began to be a giant upon the earth; he was the giant hunter before the Lord God.—As Nymbrod the giant hunter before the Lord.

(x) See Mr Bryant's Analysis, vol. 3. page 34. et seq.

(y) Orion is compounded of the Hebrew *Or* "light," and *ion* "one of the names of the sun;" and Orion was probably one of the names of that luminary.

(z) See Shuckford's Connect. vol. 1. l. 3. page 179, 180. Also the authors of the Univer. Hist. vol. 1.

(A) Huz gave name to the country of Job; Elihu, one of Job's friends, was a Buzite of the kindred of Ram or Aram, another of the sons of Nahor. Aram, whose posterity planted Syria cava, was the grandson of Nahor by Kemuel. Hence it appears probable that Job himself was a descendant of Nahor by Huz his first born.

(B) See Eut. in Dion. Perieg. ver. 763. Strabo, l. 12. page 543. Casaub. As the Chalybes were famous for manufacturing

History of I. I. These, in ancient times, were called *Alybes*, or *Chalybes*, because they were much employed in forging and polishing iron. Their neighbours, at length, gave them the name of *Chald* or *Caled*, which imports, in the Armenian dialect, *fiere, hardy, robust*. This title the Greeks adopted, and out of it formed the word *Χαλδαῖοι* "Chaldeans."

The Mosaic history informs us (c), that Ashur went out of *that land* (Shinar) and built Nineveh and several other considerable cities. One of the successors of Ashur was the celebrated Ninus, who first broke the peace of the world *, made war upon his neighbours, and obliged them by force of arms to become his subjects, and pay tribute. Some authors make him the immediate successor of Ashur, and the builder of Nineveh. This we think is not probable; Eusebius, as we have observed above, gives a list of six Arabian princes who reigned in Babylon. These we take to have been the immediate successors of Nimrod, called *Arabians*; because these people were Cushites. Ninus might be reputed the first king of the Assyrians, because he figured beyond his predecessors; and he might pass for the builder of Nineveh, because he greatly enlarged and beautified that city. We therefore imagine, that Ninus was the fifth or sixth in succession after Ashur.

Ninus, according to Diöдорus Siculus †, made an alliance with Ariæus king of the Arabians, and conquered the Babylonians. This event, in our opinion, put an end to the empire of the Hamites or Cushim in Shinar or Babylonia. The author observes, that the Babylon which figured afterwards did not then exist. This fact is confirmed by the prophet Isaiah ‡: "Behold the land of the Chasidim; this people was not till Ashur founded it for them that dwell in the wilderness. They set up the towers thereof, &c." After Babylonia was subdued by the Assyrians under Ninus, the capital was either destroyed by that conqueror or deserted by the inhabitants. At length it was re-edified by some one or other of the Assyrian monarchs, who collected the roving Chasidim, and obliged them to settle in the new city. These were subject to the Assyrian empire till the reign of Sardanapalus, when both the Medes and Babylonians rebelled against that effeminate prince.

The Chasidim were celebrated by all antiquity for their proficiency in astronomy, astrology, magic, and curious sciences. Ur or Orchoe (D) was a kind of university for those branches of learning. Such was their reputation in those studies, that over a great part of Asia and Europe a Chaldean and an astrologer were synonymous terms. These sciences, according to the tradition of the Orientals, had been invented by Seth, whom they call *Edris*; and had been cultivated by his descendants downward to Noah, by whom they were transmitted to Shem, who conveyed them to Arphaxad and his posterity.

To us it appears probable, that the religious sentiments transmitted from Noah through the line of Shem, were kept alive in the family of Arphaxad, and so handed down to the families of Serug, Nahor, Tera, Abram, Nahor II. and Haran, &c. The Jewish rabbis, and all the Persian and Mahomedan writers, make Abraham contemporary with Nimrod; who, say they, persecuted him most cruelly for adhering to the true religion. That these two patriarchs were contemporary, is very improbable, since Nimrod was the third generation after Noah, and Abram the tenth. Abram has been invested by the rabbinical writers with every department of learning. According to them, he transported from Charræ into Chanaan and Egypt, astronomy, astrology, mathematics, geography, magic, alphabetical writing, &c. &c.

After the Babylonish captivity, when the Jews were dispersed over all the east, and began to make *profelytes* of the gentes among the Pagans, wonderful things were reported of Abram with respect to his acquirements in human erudition, as well as his supereminence in virtue and piety. These legendary tales were believed by the profelytes, and by them retailed to their connections and acquaintances. But certainly the holy man either was not deeply versed in human sciences, or did not deem them of importance enough to be communicated to his posterity; since the Jews are, on all hands, acknowledged to have made little progress in these improvements. To think of raising the fame of Abraham, by classing him with the philosophers, betrays an extreme defect in judgment. He is intitled to praise of a higher kind; for he excelled in piety, was the father of the faithful, the root of the Messiah,

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fish,

manufacturing iron, so were they celebrated for making the choicest pieces of armour. They excelled in making *cuirasses*, or coats of mail, or brigantines used by the bravest of the Persian horsemen. Eochart Phaleg, l. 3. cap. 12 and 13, has proved that the word *Chelila* signifies "scales of brass or steel." From the word *Chelila*, the Greeks formed their *Χαλκίαι*, *Chalybes*. Xenoph. Cyrop. l. 3. page 43. Steph. represents the Chaldeans, who inhabited a mountainous country bordering upon Armenia, as a very fierce warlike people. Ib. page 107. we have an example of their rapacious character. Id. ib. l. 4. page 192. Hen. Steph. we have an account of their bravery and of their arms. Another instance of their rapacity occurs in their plundering the cattle of Job.

(c) A dispute has arisen about the sense of verse 10. chap. 10. Out of that land went forth Ashur, and builded Nineveh. Some approve our translation, which we think is just; others, considering that the inspired writer had been just speaking of Nimrod and the beginning of his kingdom, are of opinion that it should be translated, And out of this land *He* (that is Nimrod) went into Ashur and builded Nineveh. Thus they make a military expedition, and a violent irruption into the territory of Ashur.

(D) Ur or Orchoe was situated between Nisibis and Ctesiphon. See Ammianus Marcell. Expeditio Julianæ, l. 15. It lay not far from the river Tigris. Strabo, l. 16. page 739, tells us that the Chaldean philosophers were divided into different sects, the Orchemi, the Dorippeni, and several others. Diö. Sicul. likewise, lib. ii. page 82. Steph. gives an exact detail of the functions, profession, and establishment of the Chaldeans, to which we must refer our curious readers.

History of fish, and the friend of God. Before these, all other titles vanish away. Such of our readers, however, as have leisure enough, and at the same time learning enough to enable them to consult the rabbinical legends, will be furnished with a full and ample detail of his imaginary exploits and adventures. Others, who are either not willing or not qualified to peruse the writings of the rabbins, may consult Dr Hyde * de Relig. vet. Pers. and the authors of the Universal History †, where they will find materials sufficient to gratify their curiosity. We shall only observe, in addition to what we have already said, that the Persians, Chaldeans, and Arabians, pretended that their religion was that of Abraham; that honourable mention is made of him in the Koran; and that the name of Abraham or Ibrahim was celebrated over all the east. See АБРААМ.

* Chap. ii.
† Vol. I.

In the progress of this disquisition, we have seen that the language of Noah was, in all probability, the same or nearly the same with that of Adam. Additions and improvements might be introduced, but still the radical stamina of the language remained unchanged. It has likewise, we hope, appeared, that the confusion of language at the building of the tower of Babel was only partial, and affected none but the rebellious crew of the race of Ham and the apostate part of the families of Shem and Japhet. We have concluded, that the main body of the race of Shem, at least, were neither dispersed nor their language confounded; and that consequently the descendants of that patriarch continued to speak their paternal dialect or the uncorrupted language of Noah. To these arguments we may take the liberty to add another, which is, that in all probability the worship of the true God was preserved in the line of Arphaxad, after the generality of the other sects had lapsed into idolatry. Out of this family Abraham was taken, in whose line the true religion was to be preserved. Whether Abraham was an idolator when he dwelt in Chaldea, the scripture does not inform us, though it seems to be evident that his father was. One thing, however, is certain, namely, that Jehovah (E) appeared to him, and pronounced a blessing upon him before he left Ur of the Chaldees. This circumstance no doubt indicates, that this patriarch had made uncommon advances in piety and virtue, even prior to his emigration. The progenitors of his family had been distinguished by adhering to the true religion. About this time, however, they began to degenerate, and to adopt the zabiism of their apostate neighbours. It was then that Abraham was commanded by Heaven to "leave his kindred and his father's house, and to travel into a land which was to be shown him." The Almighty intended that the true religion should be preserved in his line, and therefore removed him from a country and kindred, by the influence of whose bad example his religious principles might be endangered. His family had only of late apostatized; till that period they had preserved both the language and religion of their venerable ancestors.

But however much Abraham might differ from the other branches of his family in his religious sentiments,

his language was certainly in unison with theirs. The consequence of this unquestionable position is, that the language which he carried with him into Chanaan was exactly the same with that of his family which he relinquished when he began his peregrinations. But if this be true, it will follow, that the language afterwards denominated Hebrew, and that of the Chasidim or Chaldeans were originally one and the same. This position, we think, will not be controverted. There is then an end of the dispute concerning the original language of mankind. We have advanced some presumptive proofs in the preceding pages, that the language of Adam was transmitted to Noah, and that the dialect of the latter was preserved in the line of Arphaxad downwards to the family of Abraham: and it now appears that the Hebrew and Chaldean were originally spoken by the same family, and of course were the same between themselves, and were actually the first language upon earth, according to the Mosaic history. Numberless additions, alterations, improvements, we acknowledge, were introduced in the course of 2000 years; but still the original stamina of the language were unchanged. Our readers will please to observe, that the Orientals are not a people given to change; and that this character, in the earliest ages, was still more prevalent than at present. This assertion, we presume, needs no proof.

In confirmation of these presumptive arguments, we may add the popular one which is commonly urged upon this occasion, viz. that the names of antediluvian persons and places mentioned by the sacred historian, are generally of Hebrew original, and significant in that language. Some of them, we acknowledge, are not so; but in this case it ought to be remembered, that a very small part of that language now exists, and that probably the radicals from which these words are descended are among the number of those which have long been lost.

SECT. I. *The Hebrew Language.*

HAVING thus proved the priority of the Hebrew to every other language that has been spoken by men, we shall now proceed to consider its nature and genius; from which it will appear still more evidently to be an original language, neither improved nor debased by foreign idioms. The words of which it is composed are short, and admit of very little flexion. The names of places are descriptive of their nature, situation, accidental circumstances, &c. Its compounds are few, and inartificially joined together. In it we find few of those artificial affixes which distinguish the other cognate dialects; such as the Chaldean, Syrian, Arabian, Phœnician, &c. We find in it no traces of improvement from the age of Moses to the era of the Babylonish captivity. The age of David and Solomon was the golden period of the Hebrew tongue; and yet, in our opinion, it would puzzle a critic of the nicest acumen to discover much improvement even during that happy era. In fact, the Jews were by no means an inventive people. We hear nothing of their progress in literary pursuits; nor do they seem to have been

^{Hebrew Language.} been industrious in borrowing from their neighbours. The laws and statutes communicated by Moses were the principal objects of their studies. These they were commanded to contemplate day and night; and in them they were to place their chief delight. The consequence of this command was, that little or no regard could be paid to taste, or any other subject of philosophical investigation. Every unimproved language abounds in figurative expressions borrowed from sensible objects. This is in a peculiar manner the characteristic of the language in question; of which it would be superfluous to produce instances, as the fact must be obvious even to the attentive reader of the English Bible.

In the course of this argument, we think it ought to be observed, and we deem it an observation of the greatest importance, that if we compare the other languages which have claimed the prize of originality from the Hebrew with that dialect, we shall quickly be convinced that the latter has a just title to the preference. The writers who have treated this subject, generally bring into competition the Hebrew, Chaldean, Syrian, and Arabian. Some one or other of these has commonly been thought the original language of mankind. The arguments for the Syrian and Arabian are altogether futile. The numerous improvements superinduced upon these languages, evidently prove that they could not have been the original language. In all cognate dialects, etymologists hold it as a maxim, that the least improved is likely to be the most ancient.

¹⁰ How it was changed into what is called the Chaldean. We have observed above, that the language of Abraham and that of the Cheshedim or Chaldeans were originally the same; and we are persuaded, that if an able critic should take the pains to examine strictly these two languages, and to take from each what may reasonably be supposed to have been improvements or additions since the age of Abraham, he will find intrinsic evidence sufficient to convince him of the truth of this position. There appear still in the Chaldean tongue great numbers of (F) words the same with the Hebrew, perhaps as many as mankind had occasion for in the most early ages; and much greater numbers would probably be found if both languages had come down to us entire. The construction of the two languages is indeed somewhat different; but this difference arises chiefly from the superior improvement of the Chaldean. While the Hebrew language was in a manner stationary, the Chaldean underwent progressive improvements; was mellowed by antitheses, rendered sonorous by the disposition of vocal sounds, acquired a copiousness by compounds, and a majesty by affixes and prefixes, &c. In process of time, however, the difference became so great, that the Israelites did not understand the Chaldean language at the era of the

Babylonish captivity. This much the prophet * intimates, when he promises the pious Jews protection " from a fierce people; a people of a deeper speech than they could perceive; of a stammering tongue, that they could not understand."

The priority of the Chaldean tongue is indeed contended for by very learned writers. Camden † calls it the mother of all languages; and most of the fathers were of the same opinion. Amira ‡ has made a collection of arguments, not inconsiderable, in favour of it; and Myriceus §, after him, did the same. Epe-¶ nius ||, in his Oration for the Hebrew tongue, thought the argument for it and the Chaldean so equal, that he did not choose to take upon him to determine the question.

Many circumstances, however, concur to make us assign the priority to the Hebrew, or rather to make us believe that it has suffered fewest of those changes to which every living tongue is more or less liable. If we strip this language of every thing obviously adventitious, we shall find it extremely simple and primitive.

1. Every thing masoretical, supposing the vowels and points (G) essential, was certainly unknown in its original character. 2. All the prefixed and affixed letters were added time after time, to give more compass and precision to the language. 3. The various voices, moods, tenses, numbers, and persons of verbs, were posterior improvements; for in that tongue, nothing at first appeared but the indeclinable radix. 4. In the same manner, the few adjectives that occur in the language, and the numbers and regimen of nouns, were not from the beginning. 5. Most of the Hebrew nouns are derived from verbs; indeed many of them are written with the very same letters. This rule, however, is not general; for often verbs are derived from nouns, and even some from prepositions. 6. All the verbs of that language, at least all that originally belonged to it, uniformly consist of three letters, and seem to have been at first pronounced as monosyllables. If we anatomize the Hebrew language in this manner, we shall reduce it to very great simplicity; we shall confine it to a few names of things, persons, and actions; we shall make all its words monosyllables, and give it the true characters of an original language. If at the same time we reflect on the small number of (H) radical words in that dialect, we shall be more and more convinced of its originality.

It will not be expected that we should enter into a minute discussion of the grammatical peculiarities of this ancient language. For these we must refer our readers to the numerous and elaborate grammars of that tongue, which are everywhere easily to be found. We shall only make a few strictures, which naturally present themselves, before we dismiss the subject.

The generality of writers who have maintained the superior

(F) Most of the Chaldean names mentioned in Scripture are pure Hebrew words compounded; such as Nebuchadnezzar, Nebuzaradan, Ralsakeb, Rabmag, Belshazzar, Ralsaris, Nabar, Malaktha, Phrat or Pharas, Barsus, Carchemish, Ur, Gutha, Heb. Cuth, &c. All these words, and a multitude of others which we could mention, approach so near the Hebrew dialect, that their original is discernible at first sight. Most of these are compounds, which the limits prescribed us will not allow us to decompound and explain.

(G) The utility of these points will be proved in the following part of this section.

(H) The radical words in the Hebrew language, as it now stands, are about 500.

11. 10. 11. 12. 13. 14. 15. 16. 17. 18. 19. 20. 21. 22. 23. 24. 25. 26. 27. 28. 29. 30. 31. 32. 33. 34. 35. 36. 37. 38. 39. 40. 41. 42. 43. 44. 45. 46. 47. 48. 49. 50. 51. 52. 53. 54. 55. 56. 57. 58. 59. 60. 61. 62. 63. 64. 65. 66. 67. 68. 69. 70. 71. 72. 73. 74. 75. 76. 77. 78. 79. 80. 81. 82. 83. 84. 85. 86. 87. 88. 89. 90. 91. 92. 93. 94. 95. 96. 97. 98. 99. 100. 101. 102. 103. 104. 105. 106. 107. 108. 109. 110. 111. 112. 113. 114. 115. 116. 117. 118. 119. 120. 121. 122. 123. 124. 125. 126. 127. 128. 129. 130. 131. 132. 133. 134. 135. 136. 137. 138. 139. 140. 141. 142. 143. 144. 145. 146. 147. 148. 149. 150. 151. 152. 153. 154. 155. 156. 157. 158. 159. 160. 161. 162. 163. 164. 165. 166. 167. 168. 169. 170. 171. 172. 173. 174. 175. 176. 177. 178. 179. 180. 181. 182. 183. 184. 185. 186. 187. 188. 189. 190. 191. 192. 193. 194. 195. 196. 197. 198. 199. 200. 201. 202. 203. 204. 205. 206. 207. 208. 209. 210. 211. 212. 213. 214. 215. 216. 217. 218. 219. 220. 221. 222. 223. 224. 225. 226. 227. 228. 229. 230. 231. 232. 233. 234. 235. 236. 237. 238. 239. 240. 241. 242. 243. 244. 245. 246. 247. 248. 249. 250. 251. 252. 253. 254. 255. 256. 257. 258. 259. 260. 261. 262. 263. 264. 265. 266. 267. 268. 269. 270. 271. 272. 273. 274. 275. 276. 277. 278. 279. 280. 281. 282. 283. 284. 285. 286. 287. 288. 289. 290. 291. 292. 293. 294. 295. 296. 297. 298. 299. 300. 301. 302. 303. 304. 305. 306. 307. 308. 309. 310. 311. 312. 313. 314. 315. 316. 317. 318. 319. 320. 321. 322. 323. 324. 325. 326. 327. 328. 329. 330. 331. 332. 333. 334. 335. 336. 337. 338. 339. 340. 341. 342. 343. 344. 345. 346. 347. 348. 349. 350. 351. 352. 353. 354. 355. 356. 357. 358. 359. 360. 361. 362. 363. 364. 365. 366. 367. 368. 369. 370. 371. 372. 373. 374. 375. 376. 377. 378. 379. 380. 381. 382. 383. 384. 385. 386. 387. 388. 389. 390. 391. 392. 393. 394. 395. 396. 397. 398. 399. 400. 401. 402. 403. 404. 405. 406. 407. 408. 409. 410. 411. 412. 413. 414. 415. 416. 417. 418. 419. 420. 421. 422. 423. 424. 425. 426. 427. 428. 429. 430. 431. 432. 433. 434. 435. 436. 437. 438. 439. 440. 441. 442. 443. 444. 445. 446. 447. 448. 449. 450. 451. 452. 453. 454. 455. 456. 457. 458. 459. 460. 461. 462. 463. 464. 465. 466. 467. 468. 469. 470. 471. 472. 473. 474. 475. 476. 477. 478. 479. 480. 481. 482. 483. 484. 485. 486. 487. 488. 489. 490. 491. 492. 493. 494. 495. 496. 497. 498. 499. 500. 501. 502. 503. 504. 505. 506. 507. 508. 509. 510. 511. 512. 513. 514. 515. 516. 517. 518. 519. 520. 521. 522. 523. 524. 525. 526. 527. 528. 529. 530. 531. 532. 533. 534. 535. 536. 537. 538. 539. 540. 541. 542. 543. 544. 545. 546. 547. 548. 549. 550. 551. 552. 553. 554. 555. 556. 557. 558. 559. 560. 561. 562. 563. 564. 565. 566. 567. 568. 569. 570. 571. 572. 573. 574. 575. 576. 577. 578. 579. 580. 581. 582. 583. 584. 585. 586. 587. 588. 589. 590. 591. 592. 593. 594. 595. 596. 597. 598. 599. 600. 601. 602. 603. 604. 605. 606. 607. 608. 609. 610. 611. 612. 613. 614. 615. 616. 617. 618. 619. 620. 621. 622. 623. 624. 625. 626. 627. 628. 629. 630. 631. 632. 633. 634. 635. 636. 637. 638. 639. 640. 641. 642. 643. 644. 645. 646. 647. 648. 649. 650. 651. 652. 653. 654. 655. 656. 657. 658. 659. 660. 661. 662. 663. 664. 665. 666. 667. 668. 669. 670. 671. 672. 673. 674. 675. 676. 677. 678. 679. 680. 681. 682. 683. 684. 685. 686. 687. 688. 689. 690. 691. 692. 693. 694. 695. 696. 697. 698. 699. 700. 701. 702. 703. 704. 705. 706. 707. 708. 709. 710. 711. 712. 713. 714. 715. 716. 717. 718. 719. 720. 721. 722. 723. 724. 725. 726. 727. 728. 729. 730. 731. 732. 733. 734. 735. 736. 737. 738. 739. 740. 741. 742. 743. 744. 745. 746. 747. 748. 749. 750. 751. 752. 753. 754. 755. 756. 757. 758. 759. 760. 761. 762. 763. 764. 765. 766. 767. 768. 769. 770. 771. 772. 773. 774. 775. 776. 777. 778. 779. 780. 781. 782. 783. 784. 785. 786. 787. 788. 789. 790. 791. 792. 793. 794. 795. 796. 797. 798. 799. 800. 801. 802. 803. 804. 805. 806. 807. 808. 809. 810. 811. 812. 813. 814. 815. 816. 817. 818. 819. 820. 821. 822. 823. 824. 825. 826. 827. 828. 829. 830. 831. 832. 833. 834. 835. 836. 837. 838. 839. 840. 841. 842. 843. 844. 845. 846. 847. 848. 849. 850. 851. 852. 853. 854. 855. 856. 857. 858. 859. 860. 861. 862. 863. 864. 865. 866. 867. 868. 869. 870. 871. 872. 873. 874. 875. 876. 877. 878. 879. 880. 881. 882. 883. 884. 885. 886. 887. 888. 889. 890. 891. 892. 893. 894. 895. 896. 897. 898. 899. 900. 901. 902. 903. 904. 905. 906. 907. 908. 909. 910. 911. 912. 913. 914. 915. 916. 917. 918. 919. 920. 921. 922. 923. 924. 925. 926. 927. 928. 929. 930. 931. 932. 933. 934. 935. 936. 937. 938. 939. 940. 941. 942. 943. 944. 945. 946. 947. 948. 949. 950. 951. 952. 953. 954. 955. 956. 957. 958. 959. 960. 961. 962. 963. 964. 965. 966. 967. 968. 969. 970. 971. 972. 973. 974. 975. 976. 977. 978. 979. 980. 981. 982. 983. 984. 985. 986. 987. 988. 989. 990. 991. 992. 993. 994. 995. 996. 997. 998. 999. 1000.

superior antiquity of the Hebrew language, have at the same time contended that all other languages of Asia, and most of those of Europe, have been derived from that tongue as their source and matrix. We, for our part, are of opinion, that perhaps all the languages in the eastern part of the globe are coeval with it, and were originally one and the same; and that the differences which afterwards distinguished them sprung from climate, caprice, inventions, religions, commerce, conquests, and other accidental causes, which will occur to our intelligent readers. We have endeavoured to prove, in the preceding pages, that all mankind were not concerned in the building of the fatal tower, nor affected by the punishment consequent upon that attempt; and we now add, that even that punishment was only temporary; since we find, that those very Hamites or Cushim, who are allowed to have been affected by it, did certainly afterwards recover the former organization of their *lip*, and differed not more from the original standard than the descendants of Japhet and Shem.

The Jewish rabbis have pretended to ascertain the number of languages generated by the vengeance of Heaven at the building of Babel. They tell us that mankind was divided into 70 nations and 70 languages, and that each of these nations had its tutelar or guardian angel. This fabulous legend is founded on the number of the progeny of Jacob at the time when that patriarch and his family went down into Egypt. Others attribute its origin to the number of the sons and grandsons of Noah, who are enumerated Gen. chap. x.

The fathers * of the church make the languages at the confusion to amount to 72; which number they complete by adding Caiman and Elishah, according to the Septuagint, who are not mentioned in the Hebrew text. This opinion, they think, is supported by the words of Moses, when he saith, that † “when the Most High divided to the nations their inheritance, when he separated the sons of Adam, he set the bounds of the people according to the number of the tribes of Israel.” That is, say they, he divided them into 72 nations, which was the number of the children of Israel when they came into Egypt. The Targum of Ben-Uzziel plainly favours this interpretation; but the Jerusalem Targum intimates that the number of nations were only 12, according to the number of the tribes of Israel. This passage, however, seems to refer to the tribes of the Chanaanim; and imports, that the Almighty assigned to the different septs of that family such a tract of land as he knew would make a sufficient inheritance for the children of Israel ‡. Others have increased the different languages of the dispersion to 120; but the general opinion has fixed them to 70 or 72. Our readers need scarce be put in mind that these opinions are futile and absurd; neither founded in Scripture, profane history, or common sense. At the same time, it must not be omitted, that, according to Horapellio §, the Egyptians held, that the world was divided into 72 habitable regions; and that, in consequence of this tradition, they made

the oenogonisthus the emblem of the world, because that in the space of 72 days that animal pines away and dies.

Hebrew language.

It has been made a question, whether the Hebrew language was denominated from Heber the progenitor of Abraham, or from a word which in that tongue imports *over, beyond*. Most of the Christian fathers, prior to St Origen, believed that both the Gentile name *Hebrew*, and the name of the language, were derived from the name of the patriarch; but that learned man imagined, that Abraham was called the *Hebrew*, not because he was a descendant of Heber, but because he was a transfluvianus, or from beyond the river Euphrates. The learned Bochart * has strained hard to prove the former position; but to us his arguments do not appear decisive. We are rather inclined to believe, that Abraham was called *Chibri*, (Hebrew), from the situation of the country from which he emigrated when he came to the country of Chanaan; and that in process of time that word became a Gentile appellation, and was afterwards applied to his posterity (1) often by way of reproach, much in the same manner as we say a *Northlander*, a *Norman*, a *Tramontane*, &c.

23 Origin of the name Hebrew.

* Phaleg, lib. 1. c. 154

Here we may be indulged an observation, namely, that Abraham, a Hebrew, lived among the Chaldeans, travelled among the Chanaanites, sojourned among the Philistines, lived some time in Egypt; and in all appearance conversed with all those nations without any apparent difficulty. This circumstance plainly proves, that all these nations at that time spoke nearly the same language. The nations had not yet begun to improve their respective dialects, nor to deviate in any great measure from the monosyllabic tongue of the Hebrews. With respect to the language of Chanaan, afterwards the Phœnician, its similarity to the Hebrew is obvious from the names of gods, men, cities, mountains, rivers, &c. which are the very same in both tongues, as might be shown in numberless cases, were this a proper place for etymological researches.

Before we dismiss this part of our subject, we would wish to gratify our unlearned readers with a brief account of the Hebrew letters, and of the Masoretical points which have been in a manner ingrafted on these letters. In the course of this deduction, we shall endeavour to follow such authors as are allowed to have handled that matter with the greatest acuteness, learning, and perspicuity. If, upon any occasion, we should be tempted to hazard a conjecture of our own, it is cheerfully submitted to the candour of the public.

Much has been written, and numberless hypotheses proposed, with a view to investigate the origin of *alphabetical writing*. To give even an abridged account of all these, would fill many volumes. The most plausible, in our opinion, is that which supposes that the primary characters employed by men were the figures of material objects analogous to those of the Mexicans, so often mentioned by the authors who have

have

* Clem. Alex. Strom. l. 1. c. 1. l. 2. c. 1. l. 3. c. 1. l. 4. c. 1. l. 5. c. 1. l. 6. c. 1. l. 7. c. 1. l. 8. c. 1. l. 9. c. 1. l. 10. c. 1. l. 11. c. 1. l. 12. c. 1. l. 13. c. 1. l. 14. c. 1. l. 15. c. 1. l. 16. c. 1. l. 17. c. 1. l. 18. c. 1. l. 19. c. 1. l. 20. c. 1. l. 21. c. 1. l. 22. c. 1. l. 23. c. 1. l. 24. c. 1. l. 25. c. 1. l. 26. c. 1. l. 27. c. 1. l. 28. c. 1. l. 29. c. 1. l. 30. c. 1. l. 31. c. 1. l. 32. c. 1. l. 33. c. 1. l. 34. c. 1. l. 35. c. 1. l. 36. c. 1. l. 37. c. 1. l. 38. c. 1. l. 39. c. 1. l. 40. c. 1. l. 41. c. 1. l. 42. c. 1. l. 43. c. 1. l. 44. c. 1. l. 45. c. 1. l. 46. c. 1. l. 47. c. 1. l. 48. c. 1. l. 49. c. 1. l. 50. c. 1. l. 51. c. 1. l. 52. c. 1. l. 53. c. 1. l. 54. c. 1. l. 55. c. 1. l. 56. c. 1. l. 57. c. 1. l. 58. c. 1. l. 59. c. 1. l. 60. c. 1. l. 61. c. 1. l. 62. c. 1. l. 63. c. 1. l. 64. c. 1. l. 65. c. 1. l. 66. c. 1. l. 67. c. 1. l. 68. c. 1. l. 69. c. 1. l. 70. c. 1. l. 71. c. 1. l. 72. c. 1. l. 73. c. 1. l. 74. c. 1. l. 75. c. 1. l. 76. c. 1. l. 77. c. 1. 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Origin of
alphabetic
writing.

have written the history of that people at the era of the Spanish invasion of their country. As this plan was too much circumscribed to be generally useful, hieroglyphical figures were in process of time invented as subsidaries to this contracted orthography. In this scheme, we imagine, the process was somewhat more extensive. A *lion* might be sketched, to import fierceness or valour; an *ox*, to denote strength; a *jag*, to signify swiftness; a *hare*, to intimate timorousness, &c.

The next step in this process would naturally extend to the inventing and appropriating of a few arbitrary characters, for representing abstract ideas, and other relations, which could not be well ascertained by the methods above-mentioned. These arbitrary signs might readily acquire a currency by compact, as money and medals do over a great part of the world.—Upon this plan we imagine the ancient Chinese formed their language.

But neither the picture nor the hieroglyphic, nor the method of denoting *ideas* by arbitrary characters appropriated by compact, could ever have arrived at such perfection as to answer all the purposes of ideal communication. The grand desideratum then would be to fabricate characters to represent simple sounds, and to reduce these characters to so small a number as to be easily learned and preserved in the memory. In this attempt the Chinese have notoriously failed; their letters, or rather their characters, are so numerous, that few, if any, of their most learned and industrious authors, have been able to learn and retain the whole catalogue. Indeed those people are not able to conceive how any combinations of 20 or 30 characters should be competent to answer all the purposes of written language.

Hesb.

Lucan.

Many different nations have claimed the honour of this invention. The Greeks ascribed it to the Phœnicians; and consequently used the word *φαινηται*, to all the Phœnicians, in the same sense with *αναγινωσκεις*, to read; and consequently the poet † ascribes the invention to the same ingenious people. The Greeks borrowed their letters from the Phœnicians, and of course looked up to them as the inventors.

Bibl. l. 1.
Nat. Hist.
lib. 7. c. 50

Others have attributed the invention to the Egyptians. That people ascribed every useful and ingenious invention to their Thyoth, or Mercury Trismegistus. Plato seems to have believed this tradition (κ), and pretends to record a dispute between the king of Egypt that then reigned and this personage, with respect to the influence that the art of alphabetic writing might possibly have upon the improvements of mankind in science and liberal arts. Diodorus the Sicilian ‡ gives a similar history of the same invention, but carries it back to the reign of Osiris.

Pliny informs us §, that Gellius attributed letters to the same Egyptian Mercury, and others to the Syrians; but that for “his part, he thought that the Assyrian letters were eternal.” That learned Roman then imagined, that the Assyrian letters had existed at

a period prior to all the records of history; which was in fact the case. By the Assyrian letters, he must mean the Chaldaic, and by the Syrian probably the Hebrew. The earliest Greek historians generally confound the Jews with the Syrians. Herodotus, enumerating the people who had * learned circumcision from the Egyptians, mentions the Syrians of Palestine; and elsewhere he tells us, that Necho † beat the Syrians, and took Cadytis, a large and populous city belonging to that people. Hence it is evident that the Syrian alphabet, or the Syrian letters, were the same with the Hebrew. That the Assyrian or Chaldaic and Hebrew languages were the same, has, we hope, been fully proved already: that their letters were the same in their original structure, can scarce be controverted. These letters, we think, were antediluvian; whether, to use the expression of Plato, they were dictated by some god, or fabricated by some man divinely inspired. As this opinion may admit some dispute, we shall take the liberty to subjoin our reasons.

Lib. 2.

c. 104.

† Ibid.

c. 159.

25
Antediluvian.

1. It appears that the era of this invention is buried in impenetrable obscurity. Had an invention of such capital importance to mankind been made in the postdiluvian ages, we imagine the author would have been commemorated in the historical annals of the country where he lived (1).

2. The art of writing in alphabetical characters, according to the sacred records, was practised at so early a period, that there was not a long enough interval between that and the deluge to give birth to that noble invention. If we consider the state of the world during some ages after that disastrous event, we shall quickly be convinced that little respite could be found from the labour and industry indispensably requisite to provide the necessaries, and only a few of the conveniencies, of life. Such a state of things was certainly most unfavourable to the invention of those arts and improvements which contribute nothing towards procuring the accommodations of life. The consequence is obvious.

Moses has recorded the history of the creation, of a few of the capital transactions of the antediluvian world, the birth, the age, the death, of the lineal descendants of Seth. He has preserved the dimensions of the ark, the duration of the universal deluge, its effects upon man and all terrestrial animals, the population of the world by the posterity of Noah, the age, &c. of the patriarchs of the line of Shem, from which his own ancestors had sprung. To this he has subjoined the petty occurrences which diversified the lives of Abraham, Isaac, and Jacob, and their descendants. Whence did the historian derive his information? We believe few of our readers will be so enthusiastic as to imagine that the author received it from divine inspiration. Tradition is a fallible guide; and in many cases the accounts are so minutely precise, as to defy the power of that species of conveyance. The inspired author must certainly have extracted

6

(κ) See *Phædrus*, page 1240. See also page 374. *Phil.*

(1) It is true, the Egyptians attribute the invention to their Thyoth, and the Phœnicians to their Hercules, or Melicerta or Baul; but these were only imaginary personages.

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tracted his abridgment from written memoirs, or histories of the transactions of his ancestors regularly transmitted from the most early periods. These annals he probably abridged, as Ezra did afterwards the history of the Kings of Israel. If this was the case, as it most certainly was, the art of writing in alphabeti-

cal letters must have been known and practised many ages before Moses. It has indeed been pretended, that the Jewish decalogue, inscribed upon two tables of stone, was the very first specimen of alphabetical writing. The arguments adduced in proof of this fact are lame and inconclusive (M). Had that been the

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(N) The most ingenious and plausible of those arguments which have fallen under our observation, is given by Mr Johnson vicar of Cranbrook, a writer of great learning and piety, who flourished in the beginning of the present century, and whose works deserve to be more generally known than we have reason to think they are at present. After endeavouring to prove that alphabetical writing was not practised before the era of Moses, and expatiating upon the difficulty of the invention, this excellent scholar attempts to show, that the original Hebrew alphabet was actually communicated to the Jewish legislator at the same time with the two tables of the law. "I know not (says he) any just cause why the law should be written by God, or by an angel at his command, except it were for want of a man that could well perform this part. This could give no addition of authority to the law, especially after it had been published in that astonishing and miraculous manner at Mount Sinai. The true writing of the original was indeed perfectly adjusted, and precisely ascertained to all future ages, by God's giving a copy of it under his own hand: but this, I conceive, had been done altogether as effectually by God's dictating every word to Moses, had he been capable of performing the office of an amanuensis." The learned writer goes on to suppose, that it was for the purpose of teaching Moses the alphabet, that God detained him forty days in the mount; and thence he concludes, that the Decalogue was the first writing in alphabetical characters, and that those characters were a divine, and not a human invention.

It is always rash, if not something worse, to conceive reasons not assigned by God himself, for any particular transaction of his with those men whom he from time to time inspired with heavenly wisdom. That it was not for the purpose of teaching Moses the alphabet that God detained him forty days in the mount, when he gave him the two tables of the law, seems evident from his detaining him just as many days when he gave him the second tables after the first were broken. If the legislator of the Jews had not been sufficiently instructed in the art of reading during his first stay in the mount, he would have been detained longer; and it is not conceivable, that though in a fit of pious passion he was so far thrown off his guard as to break the two tables, his mind was so totally unhinged by the idolatry of his countrymen, as to forget completely an art which, by the supposition, the Supreme Being had spent forty days in teaching him! "But if Moses could, at his first ascent into the mount, perform the office of an amanuensis, why are the original tables said to have been written by the finger of God, and not by him who wrote the second?" We pretend not to say why they were written by God rather than man; but we think there is sufficient evidence, that by whomsoever they were written, the characters employed were of human invention. The Hebrew alphabet, without the Masoretic points, is confessedly defective; and every man who is in any degree acquainted with the language, and is not under the influence of inveterate prejudice, will readily admit that those points are no improvement. But we cannot, without impiety, suppose an art invented by infinite wisdom, to fall short of the utmost perfection of which it is capable: an alphabet communicated to man by God, would undoubtedly have been free both from defects and from redundancies; it would have had a distinct character for every simple sound, and been at least as perfect as the Greek or the Roman.

But we need not fill our pages with reasonings of this kind against the hypothesis maintained by Mr Johnson. We know that "Moses wrote all the words of the Lord," i. e. the substance of all that had been delivered in *Exod. xx, xxi, xxii, xxiii.* before he was called up into the mount to receive the tables of stone; nay, that he had long before been commanded by God himself to "write in a book" an account of the victory obtained over Amalek (*Exod. xvii. 14.*). All this, indeed, the learned writer was aware of; and to reconcile it with his hypothesis, he frames another, more improbable than even that which it is meant to support. "It is not unreasonable (says he) to believe that God had written these tables of stone, and put them in mount Horeb, from the time that by his angel he had there first appeared to Moses; and that, therefore, all the time after, while he kept Jethro's sheep thereabouts, he had free access to those tables, and perused them at discretion." But if belief should rest upon evidence, we beg leave to reply, that to believe all this would be in the highest degree unreasonable; for there is not a single hint in Scripture of the tables having been written at so early a period, or upon such an occasion, as God's first appearance to Moses in the burning bush. We know how reluctant Moses was to go upon the embassy to which he was then appointed; and it is strange, we think passing strange, that when he records so faithfully his own backwardness, and the means made use of by God to reconcile him to the arduous undertaking, he should make no mention of these important tables, if at that period he had known any thing of their existence. Besides all this, is it not wonderful, if Moses had been practising the art of writing, as our author supposes, from the time of the burning bush to the giving of the law, he should then have stood in need of forty days teaching from God, to enable him to read with ease the first tables; and of other forty, to enable him to write the second? This gives such a mean view of the natural capacity of the Hebrew legislator, as renders the hypothesis itself wholly incredible. See a Collection of Discourses, &c. in two volumes, by the reverend John Johnson, A. M. vicar of Cranbrook in Kent.

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the case, some notice must have been taken of so palpable a circumstance. Moses wrote out his history, his laws, and his memoirs; and it appears plainly from the text, that all the learned among his countrymen could read them. Writing was then no novel invention in the age of the Jewish legislator, but current and generally known at that era.

The patriarch Job lived at an earlier period (N). In that book we find many allusions to the art of writing, and some passages which plainly prove its existence. This shows that alphabetical characters were not confined to the chosen seed, since Job was in all probability a descendant of Huz, the eldest son of Nahor * the brother of Abraham. From this circumstance, we think we may fairly conclude, that this art was known and practised in the family of Terah the father of Abraham.

3. There was certainly a tradition among the Jews in the age of Josephus, that writing was an antediluvian invention †. That historian pretends, that the descendants of Seth erected two pillars, the one of stone and the other of brick, and inscribed upon them their astronomical observations and other improvements.— This legend shows that there did exist such an opinion of the antiquity of the art of writing.

4. There must have been a tradition to the same purpose among the Chaldeans, since the writers who have copied from Berosus, the celebrated Chaldean historian (O), speak of alphabetical writing as an art well known among the antediluvians. According to them, Oannes the Chaldean legislator gave his disciples "an insight into letters and science. This person also wrote concerning the generation of mankind, of their different pursuits, of civil polity, &c. Immediately before the deluge (say they) the god Cronus appeared to Sisuthrus or Xisuthrus, and commanded him to commit to writing the beginning, improvement, and conclusion of all things down to the present term, and to bury these accounts securely in the temple of the Sun at Seppara." All these traditions may be deemed fabulous in the main; but still they evince that such an opinion was current, and that though the use of letters was not indeed eternal (P), it was, however, prior to all the records of history; and of course, we think, an antediluvian discovery.

This original alphabet, whatever it was, and however constituted, was, we think, preserved in the family of Noah, and from it conveyed down to succeeding generations. If we can then discover the original Hebrew alphabet, we shall be able to investigate the primary species of letters expressive of those articulate sounds by which man is in a great measure distinguished from the brute creation. Whatever

27 The original alphabet preserved in the family of Noah

might be the nature of that alphabet, we may be convinced that the ancient Jews deemed it sacred, and therefore preserved it pure and unmixed till the Babylonish captivity. If, then, any monuments are still extant inscribed with letters prior to that event, we may rest assured that these are the remains of the original alphabet.

There have, from time to time, been dug up at Jerusalem, and other parts of Judea, coins and medals, and medallions, inscribed with letters of a form very different from those square letters in which the Hebrew Scriptures are now written.

When the Samaritan Pentateuch was discovered (Q), it evidently appeared that the inscriptions on those medals and coins were drawn in genuine Samaritan characters. The learned Abbé Barthelemi, in his * dissertation "on the two medals of Antigonus * king of Judea, one of the later Asmonean princes, proves that all the inscriptions on the coins and medals of Jonathan and Simon Macabeus, and also on his, were invariably in the Samaritan character, down to the 40th year before the Christian era."

28 The same as with the Samaritan; Mem de l'Academ. de l'Inscrip. &c.

It were easy to prove, from the Mishna and Jerusalem talmud, that the Scriptures publicly read in the synagogues to the end of the second century were written in the Samaritan character, we mean in the same character with the Pentateuch in question. As the ancient Hebrew, however, ceased to be the vulgar language of the Jews after their return from the Babylonish captivity, the copies of the Bible, especially in private hands, were accompanied with a Chaldaic paraphrase; and at length the original Hebrew character fell into disuse, and the Chaldaic was universally adopted.

29 Which afterwards gave place to the Chaldaic.

It now appears that the letters inscribed on the ancient coins and medals of the Jews were written in the Samaritan form, and that the Scriptures were written in the very same characters: we shall therefore leave it to our readers to judge whether (considering the implacable hatred which subsisted between these two nations) it be likely that the one copied from the other; or at least that the Jews preferred to the beautiful letters used by their ancestors, the rude and inelegant characters of their most detested rivals. If, then, the inscriptions on the coins and medals were actually in the characters of the Samaritan Pentateuch (and it is absurd to suppose that the Jews borrowed them from the Samaritans), the consequence plainly is, that the letters of the inscriptions were those of the original Hebrew alphabet, coeval with that language, which we dare to maintain was the first upon earth.

It may, perhaps, be thought rather superfluous to

3 R men-

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(N) We have seen a manuscript, which may one day see the light, in which it is shown, with great probability, that Job was nearly cotemporary with the patriarch Jacob.

(O) Apollodorus, Alexander Polyhistor, Abydenus. See Syncellus, cap. 39. et seq. Euseb. Chron. l. 1. page 3.

(P) Plin. Nat. Hist. l. 7. page 413. — Ex quo apparet eternus literarum usus.

(Q) The celebrated Archbishop Usher was the first who brought the Samaritan Pentateuch into Europe. In a letter to Ludovicus Capellus "he acknowledges, that the frequent mention he had seen made of it by some authors, would not suffer him to be at rest till he had procured five or six copies of it from Palestine and Syria."

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mention, that the Samaritan colonists, whom the kings of Assyria planted in the cities of Samaria (x), were natives of countries where Chaldaic letters were current, and who were probably ignorant of the Hebrew language and characters. When those colonists embraced the Jewish religion, they procured a copy of the Hebrew Pentateuch written in its native character, which, from superstition, they preserved inviolate as they received it; and from it were copied successively the others which were current in Syria and Palestine when Archbishop Usher procured his.

From the reasons above exhibited, we hope it will appear, that if the Hebrew alphabet, as it appears in the Samaritan Pentateuch, was not the primitive one, it was at least that in which the Holy Scriptures were first committed to writing.

† Chron. i.
c. 2. v. 37.
† Prov. i.
v. 1.
Which was
introduced
by Ezra.

Scaliger has inferred, from a passage in Eusebius†, and another in St Jerom‡, that Ezra, when he reformed the Jewish church, transcribed the Scriptures from the ancient characters of the Hebrews into the square letters of the Chaldeans. This, he thinks, was done for the use of those Jews who, being born during the captivity, knew no other alphabet than that of the people among whom they were educated.—This account of the matter, though probable in itself, and supported by passages from both Talmuds, has been attacked by Buxtorf with great learning and no less acrimony. Scaliger, however, has been followed by a crowd of learned men (s), whose opinion is now pretty generally espoused by the sacred critics.

Having said so much concerning the Hebrew alphabet in the preceding pages, we find ourselves laid under a kind of necessity of hazarding a few strictures on the vowels and Masoretic points; the *first* essential, and the *last* an appendage, of that ancient language. The number of the one, and the nature, antiquity, and necessity of the other, in order to read the language with propriety and with discrimination, have been the subject of much and often illiberal controversy among philological writers. To enter into a minute detail of the arguments on either side, would require a complete volume: we shall, therefore, briefly exhibit the state of the controversy, and then adduce a few observations, which, in our opinion, ought to determine the question.

31
The Hebrew
vowels.

The controversy then is, Whether the Hebrews used any vowels; or whether the points, which are now called by that name, were substituted instead of them? or if they were, whether they be as old as Mo-

ses, or were invented by Ezra, or by the Massorites (r)? This controversy has exercised the wits of the most learned critics of the two last centuries, and is still far enough from being determined in the present. The Jews maintain, that these vowel points (u) were delivered to Moses along with the tables of the law; and consequently hold them as sacred as they do the letters themselves. Many Christian authors who have handled this subject, though they do not affirm their divine original, nor their extravagant antiquity, pretend, however, that they are the only proper vowels in the language, and regulate and ascertain its true pronunciation. Though they differ from the Jews with respect to the origin of these points, they yet allow them a pretty high antiquity, ascribing them to Ezra and the members of the great synagogue.

At length, however, about the middle of the 16th century, Elias Levita, a learned German Jew who then flourished at Rome, discovered the delusion, and made it appear that these appendages had never been in use till after the writing of the talmuds, about 500 years after Christ. This innovation raised Elias a multitude of adversaries, both of his own countrymen and Christians. Among the latter appeared the two Buxtorfs, the father and the son, who produced some cabballistical books of great antiquity (x), at least in the opinion of the Jews, in which there was express mention of the points. The Buxtorfs were answered by Capellus and other critics*, till Father Morinus†, having examined all that had been urged on both sides, produced his learned dissertation on that subject; against which there has been nothing replied of any consequence, whilst his work has been universally admired, and his opinion confirmed by those that have beaten the same field after him.

According to this learned father, it plainly appears that neither Origen, nor St Jerome, nor even the compilers of the talmuds, knew any thing of what has been called the vowel points; and yet these books, according to the same author, were not finished till the seventh century. Even the Jewish rabbis who wrote during the eighth and ninth centuries, according to him, were not in the least acquainted with these points. He adds, that the first vestiges he could trace of them were in the writings of *rabbi Ben Aber* chief of the western, and of *rabbi Ben Naphtali* chief of the eastern, school, that is, about the middle of the tenth century; so that they can hardly be said to be older than the beginning of that period.

Some

(r) II. Kings, chap. xvii. ver. 24. "And the king of Assyria brought men from Babylon, and from Cuthah, and from Avah, and from Hamath, and from Sepharvaim, and placed them in the cities of Samaria." Babylon, and Cuthah, and Avah, were neighbouring cities, and undoubtedly both spoke and wrote in the Chaldaic style. The natives of Hamath spoke the Syriac, which at that time differed very little from the Chaldaic.

(s) Casaubon, Grotius, Vossius, Bochart, Morin, Brerewood, Walton, Prideaux, Huet, and Lewis Capel, always a sworn enemy to Buxtorf. All, then, have maintained the same ground with Scaliger: how truly, appears above.

(t) The term *masorah* or *massoreth* signifies "tradition;" and imports the unwritten canon by which the reading and writing of the sacred books was fixed.

(u) These points are 14 in number, whose figures, names, and effects, may be seen in most Hebrew grammars.

(x) These books are the *Bahir*, *Zabar*, and the *Kizri*. As for the *Kizri*, the Jews make it about 1900 years old; and the other about a century later. But the fidelity of the Jews in such matters cannot be relied upon.

* Walton,
Dupin, and
Vossius.
† Morinus.
‡ De J. E.

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Some learned men (v) have ascribed the invention of the vowel points in question to the rabbis of the school of Tiberias; which, according to them, flourished about the middle of the second century. This opinion is by no means probable, because it appears plain from history, that before that period all the Jewish seminaries in that province were destroyed, and their heads forced into exile. Some of these retired into Babylonia, and settled at Sora, Nehersa, and Pumbeditha, where they established famous universities. After this era there remained no more any rabbinical schools in Judæa, headed by professors capable of undertaking this difficult operation, nor indeed of sufficient authority to recommend it to general practice, had they been ever so thoroughly qualified for exerting it.

33
The metres
Archaic.

Capellus and father Morin, who contend for the late introduction of the vowel-points, acknowledge that there can certainly be no language without vocal sounds, which are indeed the soul and essence of speech; but they affirm that the Hebrew alphabet actually contains vowel characters, as well as the Greek and Latin and the alphabets of modern Europe. These are *aleph, he, vau, iud*. These they call the *matres lectionis*, or, if you please, the parents of reading. To these some, we think very properly, add *ain* or *oin, ain*. These, they conclude, perform exactly the same office in Hebrew that their descendants do in Greek. It is indeed agreed upon all hands, that the Greek alphabet is derived from the Phœnician, which is known to be the same with the Samaritan or Hebrew. This position we shall prove more fully when we come to trace the origin of the Greek tongue. Hitherto the analogy is not only plausible, but the resemblance precise. The Hebrews and Samaritans employed these vowels exactly in the same manner with the Greeks; and so all was easy and natural.

34
Objections
answered.

But the asserters of the Masoretic system maintain, that the letters mentioned above are not vowels but consonants or aspirations, or any thing you please but vocal letters. This they endeavour to prove from their use among the Arabians, Persians, and other oriental nations: But to us it appears abundantly strange to suppose that the Greeks pronounced *beta, gamma, delta*, &c. exactly as the Hebrews and the Phœnicians did, and yet at the same time did not adopt their mode of pronunciation with respect to the five letters under consideration. To this argument we think every objection must undoubtedly yield. The Greeks borrowed their letters from the Phœnicians; these letters were the Hebrew or Samaritan. The Greeks wrote and (z) pronounced all the other letters of their alphabet, except the five in question, in the same manner with their originals of the east: if they did so, it obviously follows that the Greek and oriental office of these letters was the same.

Another objection to reading the Hebrew without the aid of the Masoretic vowel points, arises from the consideration, that without these there will be a

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Language.

great number of radical Hebrew words, both nouns and verbs, without any vowel intervening amongst the consonants, which is certainly absurd. Notwithstanding this supposed absurdity, it is a well known fact, that all the copies of the Hebrew scriptures, used in the Jewish synagogues throughout the world, are written or printed without points. These copies are deemed sacred, and kept in a coffer with the greatest care, in allusion to the ark of the testimony in the tabernacle and temple. The prefect, however, reads the portions of the law and hagiographa without any difficulty. The same is done by the remains of the Samaritans at this day. Every oriental scholar knows that the people of these countries look upon consonants as the stamina of words. Accordingly, in writing letters, in dispatches upon business, and all affairs of small moment, the vowels are generally omitted. It is obvious, that in every original language the sound of the vowels is variable and of little importance. Such was the case with the Hebrew tongue: Nor do we think that the natives of the country would find it a matter of much difficulty to learn to read without the help of the vowels. They knew the words beforehand, and so might readily enough learn by practice what vowels were to be inserted.

When the Hebrew became a dead language, as it certainly was in a great measure to the vulgar after the return from the Babylonish captivity; such subsidaries might, we think, have been useful, and of course might possibly have been adopted for the use of the vulgar: but the scribe, the lawyer, and the learned rabbi, probably disdained such vulgarly elements. We shall in this place hazard a conjecture, which, to us at least, is altogether new. We imagine that the Phœnicians, who were an inventive, ingenious people, had, prior to the age of Cadmus, who first brought their letters into Greece, adopted the more commodious method of inserting the vowels in their proper places; whereas the Jews, zealously attached to the customs of their ancestors, continued to write and read without them. In this manner the Gephuræi †, who were the followers of Cadmus, communicated them to the Jones their neighbours. We are convinced that the materials of the Greek tongue are to be gleaned up in the east; and upon that ground have often endeavoured to trace the origin of Greek words in the Hebrew, Phœnician, Chaldean, and Arabian languages. Reading without the vowel points we have seldom failed in our search; but when we followed the method of reading by the Masoretic points, we seldom succeeded; and the more this, we believe, every man of tolerable erudition who will make a trial will find by experience to be true. This argument appears to us superior to every objection. Upon this basis, the most learned Bochart has erected his etymological fabric, which will be admired by the learned and ingenious as long as philology shall be cultivated by men.

* Masor.
lib. i.
cap. 59.

† Masor.
lib. i.
cap. 59.

3 R 2

It

(v) See Buxtorf the father, in Tiber. cap. 5, 6, 7. Buxtorf the son de Antiq. Punct. P. II. 11.

(z) This is so true, that, according to Heicychius and Suidas, *zeta*, to act the Phœnician, signified “to read.”

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It has been urged by the zealots for the Masoretic system, that the Arabians and Persians employ the vowel points. That they do so at present is readily granted; but whether they did so from the beginning seems to be the question. That Arabia was overspread with Jewish exiles at a very early period, is abundantly certain. It was natural for them to retire to a land where they would not hear of war nor the sound of the trumpet. Accordingly we find that, prior to the age of the Arabian invader, Arabia swarmed with Jewish settlements. From these Jews, it is highly probable that their neighbours learned the use of the points in question; which in the course of their conquests the Saracens communicated to the Persians.

It has been alleged with great show of reason, that without the vowel points, it is often impossible to develop the genuine signification of many words which occur frequently in the language; many words of different and sometimes opposite significations are written with exactly the same consonants. Without the points then, how are we to know the distinction? In answer to this objection, we beg leave to observe, that, during the first period of a language, it is impossible that there should not occur a number of similar sounds of different significations. This is surely to be attributed to the poverty of the language. When a few terms have been once fabricated, men will rather annex new significations to old terms, than be at the expence of time or thought to invent new ones. This must have been the case with the Hebrew in particular; and indeed no language on earth is without instances of this inconveniency, which, however, in a living tongue, is easily overcome by a difference of accent, tone, gesture, pronunciation; all which, we think, might obviate the difficulty.

From the preceding arguments, we think ourselves authorized to infer that the Masora is a novel system, utterly unknown to the most ancient Jews, and never admitted into those copies of the Scriptures which were deemed most sacred and most authentic by that people.

According to ORIGEN.

Brëshith bara Elôeim eth ashamaim oueth aares.
Ouavares aietha Thôau ouboou ouôfekh al phne The-
ôm ourouê elôeim marapheth al phne amaim.

Ouômêr elôeim iei ôr ouiei ôr.

Ouïar elôeim eth aôr khi tôb ouïabdel elôeim bêu
aôr oulên aôfekh.

Upon the whole, we presume to give it as our opinion, that in the most early periods, the vowels *aleph*, *he*, *jod* or *yod*, *vau* or *vauu*, and perhaps *oin* or *ajin*, were regularly written wherever they were sounded. This to us appears plain from the practice of the ancient Greeks. It is agreed on all hands that the Samaritan and Phœnician alphabets were the same; and that the former was that of the Jews originally. The Phœnicians certainly wrote the vowels exactly, for so did the Greeks who copied their alphabet: If the Phœnicians wrote their vowels, so then did the Jews of the age of Cadmus; but Cadmus was contemporary with some of the earliest judges of Israel; the consequence is evident, namely, that the Jews wrote their

37
And the
practice of
the ancient
Greeks.

With respect to the original introduction of the points, we agree with the learned and judicious * Dr Prideaux, who imagines that they were gradually introduced after the Hebrew became a dead language, with a view to facilitate the learning to read that language, more especially among the vulgar. By whom they were introduced, we think, cannot easily be determined; nor is it probable that they were all introduced at once, or by one and the same person. They have been ascribed to Ezra by many, for no other reason that we can discover but to enhance their authenticity, and because the sentiment is analogous to the other articles of reformation established by that holy priest. If our curious reader should not be satisfied with the preceding detail, we must remit him to Capellus and Morinus on the one side, and the two Buxtorfs, Schultens, and Dr James Robertson professor of oriental languages in the university of Edinburgh, on the other. This learned orientalist, in his dissertation prefixed to his *Chavis Pentateubi*, has collected and arranged, with a true spirit of criticism, every thing that has been advanced in favour of the Masoretical system. — *Si Pergama dextra defendi possent, etiam hac defensa fuissent.*

St Origen, who flourished about the beginning of the 3d century, was a profound Hebrew scholar. He published a most laborious and learned work, which is generally called the *Hexapla*, because it consisted of six columns; the first of which contained the Hebrew text; the second, the same text, but written in Greek characters; the third column exhibited the version of Aquila; the fourth, that of Symmachus; the fifth, the Septuagint; and the sixth, the version of Theodotus. In some fragments of that vast work which are still extant, we have a specimen of the manner in which the Hebrew was pronounced in the third century, by which it appears that it was very different from that which results from observing the Masoretical points. The following is an instance copied from the beginning of Genesis.

According to the MASORITES.

Bereshith bara Elohim eth ashamajim veeth aaretz.
Vaaaretz ajetha thouu vaboou, vekhoihek gnal penê
theom verouakh elohim merakhepheth gnal penê ham-
mâim.
Vaïomer elohim jehi or, vajehi or.
Vajare elohim eth aor ki tob vajabedel elohim bein
aor oubein hakhoshek.

vowels as late as the arrival of that Colony-chief in Greece. We ought naturally to judge of the Hebrew by the Chaldaic, Syriac, and Arabian, its sister dialects. All these languages in ancient times had their vowels regularly inserted; and why not the Hebrew in the same manner with the rest?

As these first vowels, which were coeval with the other letters, often varied in their sound and application, the points, in all appearance, were first invented and employed to ascertain their different sounds in different connections. Other marks might be invented to point out the various tones of voice, like the *tau*, or accents, with which the vowels were to be enounced, as was done among the later Greeks. In

Hebrew
Language.
* Gen.
Part I.
Book I.

36

From Ori-
gen's Hex-
apla.

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Language.

process of time, in order to promote celerity of writing, the vowels were omitted, and the points substituted in their place.

Before we conclude our observations on the Hebrew language, we ought, perhaps, to make an apology for omitting to interlard our details with quotations from the two Talmuds, the Mishna, the Gemara, the Cabbalas, and a multitude of rabbinical writers who are commonly cited upon such an occasion. We believe we could have quoted almost numberless passages from the two Buxtorfs, Father Morin, Capellus, and other Hebrew critics, with no great trouble to ourselves, and little emolument to the far greater part of our readers. But our opinion is, that such a pedantic display of philological erudition would probably have excited the mirth of our learned, and roused the indignation of our unlearned, readers. Our wish is to gratify readers of both descriptions, by contributing to the edification of one class without disgusting the other.

We cannot, we imagine, handsomely take leave of the sacred language without giving a brief detail of those excellencies which, in our opinion, give it a just claim to the superiority over those other tongues which have sometimes contended with it for the prize of antiquity: and of these the following in our apprehension deserve particular notice.

38
Excellen-
cies of the
Hebrew
language.

If this language may claim any advantage over its antagonists, with respect to its being rather a mother than a daughter to any of them, it is undoubtedly in consequence of its simplicity, its purity, its energy, its fecundity of expressions and significations. In all these, notwithstanding its paucity of words, it excels the vast variety of other languages which are its cognate dialects. To these we may add the significance of the names, both of men and brutes; the nature and properties of the latter of which are more clearly and more fully exhibited by their names in this than in any other tongue hitherto known. Besides, its well authenticated antiquity and the venerable tone of its writings surpass any thing left upon record in any other dialect now extant in the world. These extraordinary qualities excite our admiration at present under every disadvantage; and from this circumstance we may infer its incomparable beauty in the age of the Jewish legislator, and what effects it would naturally produce, could we know it now as it was spoken and written in the days of David and Solomon.

As far, however, as we understand it in its present mutilated condition, and are able to judge of its character from those few books that have come down to our time, we plainly perceive that its genius is simple, primitive, natural, and exactly conformable to the character of those uncultivated patriarchs who used it themselves, and transmitted it to their descendants in its native purity and simplicity. Its words are comparatively few, yet concise and expressive; derived from a very small number of radicals, without the artificial composition of modern languages. No tongue, ancient or modern, can rival it in the happy and rich fecundity of its verbs, resulting from the variety and significance of its conjugations; which are so admirably arranged and diversified, that by changing a letter or two of the primitive, they express the various modes of acting, suffering, motion, rest, &c. in such a pre-

cise and significant manner, that frequently in one word they convey an idea which, in any other language, would require a tedious paraphrase. These positions might easily be illustrated by numerous examples; but to the Hebrew scholar these would be superfluous, and to the illiterate class neither interesting nor entertaining.

To these we may add the monosyllabic tone of the language, which, by a few prefixes and affixes without affecting the radix, varies the signification almost at pleasure, while the method of affixing the person to the verb exhibits the gender of the object introduced. In the nouns of this language there is no flexion except what is necessary to point out the difference of gender and number. Its cases are distinguished by articles, which are only single letters at the beginning of the word: the pronouns are only single letters affixed; and the prepositions are of the same character prefixed to words. Its words follow one another in an easy and natural arrangement, without intricacy or transposition, without suspending the attention or involving the sense by intricate and artificial periods. All these striking and peculiar excellencies combined, plainly demonstrate the beauty, the stability, and antiquity of the language under consideration.

We would not, however, be thought to insinuate that this tongue continued altogether without changes and imperfections. We admit that many radical words of it were lost in a course of ages, and that foreign ones were substituted in their place. The long sojourning of the Israelites in Egypt, and their close connection with that people, even *quoad sacra*, must have introduced a multitude of Egyptian vocables and phrases into the vulgar dialect at least, which must have gradually incorporated with the written language, and in process of time have become parts of its essence. In Egypt, the Israelites imbibed those principles of idolatry which nothing less than the final extirpation of their polity could eradicate. If that people were so obstinately attached to the Egyptian idolatry, it is not very probable that they would be averse from the Egyptian language. Besides, the Scripture informs us, that there came up out of Egypt *a mixed multitude*; a circumstance which must have infected the Hebrew tongue with the dialect of Egypt. As none of the genuine Hebrew radicals exceed three letters, whatever words exceed that number in their radical state may be justly deemed of foreign extraction.

Some Hebrew critics have thought that verbs constitute the radicals of the whole language; but this opinion appears to us ill founded: for though many Hebrew nouns are undoubtedly derived from verbs, we find at the same time numbers of the latter deduced from the former.

Before we conclude our detail of the Hebrew tongue, a few of our readers may possibly imagine that we ought to give some account of the Hutchinsonian system; a system so highly in vogue not many years ago. But as this allegorical scheme of interpretation is now in a manner exploded, we shall beg leave to remit our curious Hebraist to Mr Holloway's Originals a small book in 2 vols 8vo, but replete with multifarious erudition, especially in the Hutchinsonian style and character.—*Fides fit penes autorem.*

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Language.

SECT. II. The Arabic Language.

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We now proceed to give some account of the Arabian language, which is evidently one of the sister dialects of the Hebrew. Both, we imagine, were originally the same; the former highly improved and civilized; the latter, in appearance, retaining its original simplicity and rude aspect, spoken by a people of a genius by no means inventive. In this inquiry, too, as in the former, we shall spare ourselves the trouble of descending to the grammatical minutiae of the tongue; a method which, we are persuaded, would neither gratify our learned nor edify our unlearned readers. To those who are inclined to acquire the first elements of that various, copious, and highly improved tongue, we beg to recommend *Persian and Modern Lang. Arab. Gram. Arab.* the Dissertations of Heriri, translated by the Chief Schultens; Mr Richardson's *Persic and Arabic Gram.* &c.

We have pronounced the Hebrew and Arabian sister dialects; a relation which, as far as we know, has been seldom controverted: but we think there is authentic historical evidence that they were positively one and the same, at a period when the one as well as the other appeared in its infant undorned simplicity. The following detail will, we hope, fully authenticate the truth of our position.

Gen. x.
25.

"Unto Eber (says the Scripture *) were born two sons. The name of one was Peleg, because in his days the earth was divided; and his brother's name was Joktan," or rather Yoktan. This last, says the sacred historian, "had thirteen sons; and their dwelling reached from Mesha (Mocha) to Sephar (A)," a mount of the east. According to this account, the descendants of Yoktan possessed all the maritime coast of Arabia from Mesha (Mocha) to mount Sephar towards the east of that peninsula. Moses, describing the rivers of paradise, tells us, that one of the branches of that river † "encompassed the whole land of Havilah, where there was great store of gold." Havilah was the twelfth son of Yoktan, whom the Arabians call Kobtan; and consequently his territory was situated towards the eastern limit of the possessions of the posterity of the youngest son of Eber. Yoktan or Kobtan was too young to be concerned in the building of the tower; and consequently retained the language of his family, which was undoubtedly the Hebrew. His descendants must have carried the same language into their respective settlements, where it must have been transmitted to succeeding generations. The original language of all the tribes of the Arabians who inhabit a vast tract of country along the southern shore, according to this deduction, was that of their father Kobtan, that is, the Hebrew. Indeed, the most learned Arabians of modern times unanimously acknowledge this patriarch as the founder of their language as well as of their nation.

The other districts of Arabia were peopled by the offspring of Abraham. The Ishmaelites, the posterity

of that patriarch by Hagar, penetrated into the very centre of the peninsula; incorporated, and in process of time became one people with the Kobtanites. Another region was possessed by the children of the same holy man by Chetumah his second wife. The Moabites, Ammonites, Edomites, Amalekites, &c. who settled in the various regions of Arabia Petraea, were all branches of Abraham's family, and used the same language with their great progenitor. The Scripture indeed speaks of people who inhabited the country last mentioned prior to the branches of Abraham's family; but these, according to the same history, were extirpated by the former. The conclusion then is, if we credit the Mosiac account, that all the inhabitants of the three divisions of Arabia did, in the earliest periods, **universally use the Hebrew tongue.**

There was, we are sensible, a region of Arabia inhabited by the Cushim, or descendants of Cush. This district was situated on the confines of Babylonia. Our translators have confounded this country with the modern Ethiopia; and have consequently ascribed the exploits of the Arabian Cushim to the Ethiopians. The Arabian kings of Babylonia were of these Cushim. These were conquered and expelled Babylonia by the Chaldeim. These spoke the Chaldean dialect, as will appear when we come to speak of that of the Assyrians. Here the candid reader is desired to reflect that the Hebrew and Chaldaic are cognate dialects.

The foregoing proofs, deduced from the Mosiac history, will be corroborated by a mass of internal evidence in the succeeding parts of our inquiry.

The Arabic tongue, originally pure Hebrew, was in process of time greatly transformed and altered from its simple unsophisticated state. The Arabians were divided into many different tribes; a circumstance which naturally produced many different dialects. These, however, were not of foreign growth. No foreign enemy ever conquered those independent hords. The Persians, Greeks, and Romans, sometimes attempted to invade their territories; but the roughness of the ground, the scarcity of forage, the penury of water, and their natural bravery, always protected them. They were indeed once invaded by the Abyssinians or Ethiopians with some show of success; but these invaders were in a short time expelled the country. Their language, of consequence, was never adulterated with foreign words or exotic phrases and idioms. Whatever augmentations or improvements it received were derived from the genius and industry of the natives, and not from adventitious or imported acquisitions. From this circumstance we may justly infer, that the Arabian tongue was a long time stationary, and of course differed in no considerable degree from its Hebrew archetype. The learned Schultens, in his Commentary on Job, hath shown, to the conviction of every candid inquirer, that it is impossible to understand that sublime composition without having recourse to the Arabic idioms. That patriarch was a Chuzite. His country might be reckoned a part of Arabia. His three friends were actually Arabians,

41
Gradually
deviated
from that
simplicity.

Gen. ii.
31.

(A) Sephar, in the Septuagint Σαργα, and in some editions Σαργα; hence probably Σαργα. Orig. in Job. cap. xxii. ver. 14. *ἐν τῇ ὁρᾷ τῇ ἐκ τῆς ὁρᾷ τῆς ὁρᾷ*

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Arabians, being the descendants of Ishmael and Esau. His country bordered upon that of the predatory Chaldeans, who were an Arabian banditti. When we consider all these circumstances *in cumulo*, we are strongly inclined to believe that the book of Job was actually written in Arabic, as the language stood at that period; which, according to the most probable opinion, could not have been later than the age of Moses. The learned are generally agreed that this whole book, the three first chapters excepted, is a poetical composition, replete with the most brilliant and most magnificent imagery, the boldest, the justest, and most gorgeous tropes and allusions, and a grandeur of sentiment wholly divine. Whoever has read the poetical compositions of the modern Arabians, on divine subjects, with any degree of taste, will, we flatter ourselves, discover a striking similarity both of diction and sentiment. Be this as it may, we think there is no reason to conclude that the Arabic dialect deviated much from the Hebrew standard prior to the Christian era.

42
The two
principal
dialects of
Arabia.

Of those different dialects which prevailed among the various tribes among which the peninsula of Arabia was divided, the principal were the Hemyaret and the Koreish. Though some of these were tributary to the Tobbas, or Hemyaret sovereign of Arabia Felix, yet they took no great pains to cultivate the language of that province, and of course these people did not thoroughly understand it. As for the independent tribes, they had no temptation to cultivate any other language than their own.

The Koreish tribe was the noblest and the most learned of all the western Arabs; and the kaaba, or square temple of Mecca, was before the era of Mohammed solely under their protection. This temple drew annually a great concourse of pilgrims from every Arabian tribe, and indeed from every other country where the Sabian religion prevailed. The language of the Koreish was studied with emulation by the neighbouring tribes. Numbers of the pilgrims were people of the first rank, and possessed all the science peculiar to their country or their age. Great fairs were held during their residence at Mecca, and a variety of gay amusements filled up the intervals of their religious duties. In these entertainments literary compositions bore the highest and most distinguished rank; every man of genius considering not his own reputation alone, but even that of his nation or his tribe, as interested in his success. Poetry and rhetoric were chiefly esteemed and admired; the first being looked upon as highly ornamental, and the other as a necessary accomplishment in the education of every leading man. An assembly at a place called *Oadh*, had been in consequence established about the end of the sixth century, where all were admitted to a rivalry of genius.

43
The dialect
of the Ko-
reish be-
came the
politest,
and why.

The merits of their respective productions were impartially determined by the assembly at large; and the most approved of their poems, written on silk, in characters of gold, were with much solemnity suspended in the temple as the highest mark of honour which could be conferred on literary merit. These poems were called the *Moallabat*, "suspended," or *Modhabebat*, "golden." Seven of these are still preserved in many European libraries.

From this uncommon attention to promote emula-

tion, and refine their language, the dialect of the Koreish became the purest, the richest, and the most polite of all the Arabian idioms. It was studied with a kind of predilection; and about the beginning of the seventh century it was the general language of Arabia, the other dialects being either incorporated with it, or sliding gradually into disuse. By this singular idiomatic union the Arabic has acquired a prodigious fecundity; whilst the luxuriance of synonymes, and the equivocal or opposite senses of the same or similar words, hath furnished their writers with a wonderful power of indulging, in the fullest range, their favourite passion for antithesis and quaint allusion. One instance of this we have in the word *veli*; which signifies a prince, a friend, and also a slave. This same word, with the change of one letter only, becomes *vah*; which, without equivocation, imports a sovereign. Examples of this kind occur in almost every page of every Arabic dictionary.

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Language.

But all those advantages of this incomparable language are merely modern, and do not reach higher than the beginning of the sixth century. Prior to that era, as we have observed above, a variety of dialects obtained; and as the Arabs were by their situation in a manner sequestered from all the rest of mankind, it may not perhaps be superfluous to inquire briefly into the cause and origin of this instantaneous and universal change.

44
This time-
rarity mo-
dern.

For a course of more than 20 centuries the Arabians had been shut up within the narrow limits of their own peninsula, and in a great measure secluded from the rest of the world. Their commerce with India was purely mercantile, and little calculated to excite or promote intellectual improvements. They traded with the Egyptians from time immemorial; but since the invasion and usurpation of the pastor kings, every shepherd, that is, every Arabian, was an abomination to the Egyptians. From that quarter, therefore, they could not derive much intellectual improvement. Besides, when an extensive territory is parcelled out among a number of petty sects or clans, the feuds and contentions which originate from interfering interests and territorial disputes, leave but little time, and less inclination, for the culture of the mind. In these circumstances, the military art alone will be cultivated, and the profession of arms alone will be deemed honourable. Of consequence, we find that, in the general opinion, poetry, rhetoric, and the profession of arms, were the only sciences cultivated by the people in question. As for the science of arms, we are convinced that it was both studied and practised at a very early period; but as to the two former, we imagine they were very late acquisitions, and sprung from some circumstance external and adventitious.

The tribe of the Koreish were much engaged in commerce. They exported frankincense, myrrh, cassia, galbanum, and other drugs and spices, to Damascus, Tripoli, Palmyra, and other commercial cities of Syria and its neighbourhood. Upon these occasions the Arabian traders must have become acquainted with the Greek language, and perhaps with the more amusing and affecting parts of the Grecian literature. They might hear of the high renown of Homer and Demosthenes; and it is not impossible that some of them might be able to read their compositions. Every body

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body knows with what unremitting ardour the learned Arabs, under the first khaliffs, perused and translated the philosophical works of the Grecian sages. The very same spirit might animate their predecessors, though they wanted learning, and perhaps public encouragement, to arouse their exertions. From this quarter, we think, the Arabs may have learned to admire, and then to imitate, the Grecian worthies.

The Ptolemies of Egypt were the professed patrons of commerce as well as of learning. Under these princes all nations were invited to trade with that happy country. The Arabs, now no longer fettered by Egyptian jealousy, carried their precious commodities to Alexandria; where the Grecian literature, though no longer in its meridian splendor, shone however with a clear unsold lustre. The court of the first Ptolemies was the retreat of all the most celebrated geniuses of Greece and of the age; in a word, Alexandria was the native land of learning and ingenuity. Here the ingenious Arab must have heard the praises of learning incessantly proclaimed; must have been often present at the public exhibitions of the poets and orators; and even though he did not understand them exactly, might be charmed with the melody of the diction, and struck with surprise at their effects on the audience. The reader will please to reflect, that the Arabian traders were the first men of the nation, both with respect to birth, learning, and fortune. These wise men, to use the language of

45
Institution
at Mecca
similar to
the Olympic
games.

Scripture, inspired with the natural curiosity of their race, might hear of the celebrated Olympic games, the public recitations before that assembly, and the glorious prize bestowed upon the conquerors. Such information might animate them to institute something parallel at Mecca, with a view to improve their language, and at the same time to derive honour and emolument to themselves. The Koreishim might promise themselves the like advantages from the establishment of the fair and assembly at Ocadh, as the natives of Elis drew from the institution of the Olympic games. For these reasons, we conjecture, the literary competitions at the place just mentioned were instituted at so late a period, though the nation had existed more than 2000 years before the establishment of this anniversary. Upon the whole, we are inclined to believe, that the Arabs, notwithstanding all the fine things recorded of them by their own poetical historians, and believed perhaps too easily by those of other countries, were in the days of ignorance like the earliest Romans, *latrones et semibarbari*. For our part, we think it by no means probable, that a people of that character should, after so long a course of years, have stumbled upon so laudable and so beneficial an institution, without taking the hint from some foreign one of a similar complexion. This we acknowledge is only a conjecture, and as such it is submitted to the judgment of the reader.

There were, as has been observed above, two principal dialects of the original Arabic: The Hamyarite spoken by the genuine Arabs, and the Koreishite or pure Arabic, which at last became the general language of that people. The former of these inclined towards the Syriac or Chaldean; the latter being, according to them, the language of Ishmael, was deeply tinged with the Hebrew idiom. The oriental writers tell us

that Terah, the grandfather of Hamyar, was the first whose language deviated from the Syriac to the Arabic. Hence, say they, the Hamyaritic dialect must have approached nearer to the purity of the Syriac, and of consequence must have been more remote from the true genius of the Arabic than that of any of the other tribes. The fact seems to stand thus: The Hamyarites were neighbours to the Chaldeans and Syrians, and consequently were connected with those people by commerce, wars, alliances, &c. This circumstance introduced into their language many phrases and idioms from both these nations. That Terah was concerned in adulterating the dialect of the Hamyarites, is a mere oriental legend, fabricated by the Arabs after they began to peruse the Hebrew Scriptures. The Koreish being situated in the centre of Arabia, were less exposed to intercourse with foreigners, and therefore preserved their language more pure and untainted.

The learned well know, that the Koran was written in the dialect of the Koreish; a circumstance which communicated additional splendor to that branch of the Arabian tongue. It has been proved, that the language of the original inhabitants of Arabia was genuine Hebrew; but upon this supposition a question will arise, namely, whether the Arabians actually preserved their original tongue pure and unsophisticated during a space of 3000 years, which elapsed between the deluge and the birth of Mohammed? or, whether, during that period, according to the ordinary course of human affairs, it underwent many changes and deviations from the original standard?

The admirers of that language strenuously maintain the former position; others, who are more moderate in their attachment, are disposed to admit the latter. Chardin observes of the oriental languages in general, that they do not vary and fluctuate with time like the European tongues. "Ce qu'il y a de plus admirable, dit-il, et de plus remarquable, dans ces langues, c'est, qu'elles ne changent point, et n'ont point changé du tout, soit à l'égard de termes, soit à l'égard du tour: rien n'y est, ni nouveau ni vieux, nulle bonne façon de parler, n'a cessé d'être en crédit. L'Alcoran, par exemple, est aujourd'hui, comme il y a mille années, le modèle de plus pure, plus courte, et plus éloquente diction." It is not to our purpose to transcribe the remaining part of the author's reflection upon this subject: From the above it plainly appears that he concludes, that the Arabian tongue has suffered no change since the publication of the Koran; and at the same time insinuates, that it had continued invariable in its original purity through all ages, from the days of Kobtan to the appearance of that book. Whether both or either of these sentiments is properly authenticated will appear in the sequel.

The learned Dr Robertson, professor of oriental languages in the university of Edinburgh, informs us, that deputed by the Arabians, in order to preserve the purity of their language, strictly prohibited their merchants, who were obliged to go abroad for the sake of commerce, all commerce with strange women. We know not where this injunction is recorded, but certainly it was a most terrible interdict to an amorous son of the desert. If such a prohibition actually existed, we suspect it originated from some other source than the fear of corrupting their language. Be that as it may, the Doctor,

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46
The Koran
written in
the Koreish
dialect.

* Voyage,
vol. 1, p. 43.

47
Means to
deputed by
the Arabs
to preserve
the purity
of their lan-
guage.

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language.

tor, as well as the great Schultens, is clearly of opinion, that the language in question, though divided into a great number of streams and canals, still flowed pure and limpid in its course.

48
The style
of the Ko-
ran now
obsolete,

Our readers who are acquainted with the history of the orientals are already apprized of the steady attachment of those people to ancient customs and institutions. We readily allow, that in the article of Language this same predilection is abundantly obvious; but every oriental scholar must confess, that the style of the Koran is at this day in a manner obsolete, and become almost a dead language. This fact, we believe, will not be questioned. If the Arabian has deviated so very considerably from the standard of the Koran in little more than 1000 years, and that too after an archetype is ascertained; by a parity of reason we may infer, that much greater deviations must have affected the language in the space of 3000 years.

It is universally allowed by such as maintain the unsullied purity of the Arabian tongue, that it was originally the same with the Hebrew, or with the ancient Syriac and Chaldaic. Let any one now compare the words, idioms, and phraseology of the Koran with the remains of those three languages, and we think we may venture to affirm that the difference will be palpable. This circumstance, one would think, indicates in the strongest terms a remarkable alteration.

The Arabs themselves are agreed, that, notwithstanding the amazing fecundity of their language, vast numbers of its radical terms have been irrecoverably lost. But this loss could not be supplied without either fabricating new words or borrowing them from foreign languages. To the latter method we have seen their aversion; and must therefore conclude that they adopted the former.

The Chaldeans, Syrians, and Phœnicians, had made innovations on their language at a very early period, even before conquests were undertaken: We see no reason to suppose that the Arabs did not innovate as well as their nearest neighbours: the Hamyarites did actually innovate.

49
and re-
sembling
the He-
brew in its
phraseolo-
gy.

There are, we think, very strong reasons to believe, that Job was an Arabian, and flourished prior to Moses, perhaps as early as Jacob. The style, the genius, the figurative tone of the composition; the amazing sublimity of the sentiments, the allusions, the pathos, the boldness, the variety, and irregularity; the poetical enthusiasm which pervade the whole poem, strongly breathe the Arabian spirit: indeed the very diction is peculiar to that single book, and differs widely from that of the Psalms and every poetical part of the sacred canon. If we compare this book with Mohammed's Koran, we shall scarce find any resemblance of words or phraseology; but a wonderful similarity of figures, enthusiasm, and elevation of sentiments.

We are then led to conclude, that the Arabic did actually lose and gain a multitude of vocables between the era of its first establishment among the descendants of Joktan and Ishmael and the birth of the impostor.

The art of writing was introduced among the Arabs at a very late period: Without the assistance of this art, one would think it altogether impossible to preserve any language in its primæval purity and simplicity. Our curious readers may here expect some ac-

count of the Arabic characters: the following detail is the most probable one we have been able to collect on that subject.

It is generally agreed*, that the art of writing was known among the Hamyarites or Homerites at a very early period. These people were sovereigns of Arabia during a course of many ages. Their character was somewhat perplexed and confused. It was called *alting* among the Hamyarites. The alphabet of these people resembled that of the Hebrews both in the number and order of the letters, and is called *abgad beviz* †, from the first ten letters of the Hebrew alphabet, artificially thrown together.

“And this word (says the learned Chardin ‡) *a, b, g, d*, is formed of the four letters which were heretofore the first in the Arabian language, as they are still in that of the Hebrews.” The same traveller is positive that these were the ancient characters of the Arabs;

that they differed from Cuphite letters, which were afterwards introduced; and that they were furnished with vowel points. These, we imagine, were the first rude sketches of the Chaldean character, which probably the Hamyarites retained in their first unpolished form, after they had been polished and reduced to a more elegant size by the original inventors.

Monuments bearing inscriptions in these characters are, they tell us, still to be seen in some places of Arabia. Some were engraved on rocks; and to these we think it probable that the patriarch Job alludes in those passages where he seems to intimate an inclination to have his sufferings recorded in a book and graven in the rock for ever. All the Arabians agree, that the dialect of the Hamyarites inclined towards the Syriac or Chaldean. This we have imputed to the connection of that people with the Chaldeans, who lived in their neighbourhood. If the Hamyaritic dialect was infected with the Syriac or Chaldaic, there can be no doubt that they derived their letters from the same quarter.

We conclude then, that the Hamyarites knew the art of writing from the earliest antiquity, and that the letters they employed were the rude Chaldaic in their unimproved state. Some of the Arabians do indeed hold, that Ishmael was the first author of letters; but that his characters were rude and indistinct, without any interval between letters or words, and that these were adopted by Kedar and his other children: but this tradition hath met with little credit.

With respect to the highly polished Koreishites, it is agreed on all hands, that they were unacquainted with the use of letters till a few years before the birth of Mohammed. Two difficulties here present themselves. The first is, how the Koreishite dialect, without the art of writing, happened to excel all the other dialects of the Arabic tongue, assisted by that art, apparently so necessary for preserving a language in its original purity. The second is still, we think, rather greater, namely, how the Koreish learned that most useful art at so late a period as the sixth century. It is a well known fact, that ever after the Babylonish captivity Arabia swarmed with Jewish villages, in which the art of writing was generally known; and almost at the beginning of the Christian era, multitudes of Christians retired to the same country, in order to avoid the persecutions which they suffered in the Roman empire. In these circumstances, we think it rather

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ther strange, that the Koreishites, highly polished and acute as they were, never thought of laying hold on the opportunity of learning an art so very useful. These two problems we leave to be solved by our more learned readers.

But however they be solved, it is universally acknowledged, that the Koreish were ignorant of letters till a few years before the birth of their prophet. Ebn Chalican (a), one of their most celebrated historians, informs us, that Moramer the son of Morra, an Anbarian, a native of Anbaris, a city of Irak (c), first invented alphabetical characters, and taught his countrymen to use them, from whom this noble invention was derived to the Koreishites. These letters, though neither beautiful nor convenient, were long used by the Arabs. They were denominated *Cuphite*, from *Cupha* a city of Irak. In this character the original copy of the Koran was written. These we think were the original clumsy characters which were retained by the vulgar after the beautiful square Chaldaic letters were invented; and probably used by priests, philosophers, and the learned in general. These letters are often at this day used by the Arabs for the titles of books and public inscriptions.

* Robert
Claver, Pent.
P. 35, 36.
53
Improved
about 100
years after
Moham-
med.

Abauli the son of Mocla*, about 300 years after the death of Mohammed, found out a more elegant and more expeditious character. This invention of Abauli was afterwards carried to perfection by Ebn Bowla, who died in the year of the hegira 413, when Kader was caliph of Bagdad. This character, with little variation, obtains at this day. As we think this article of some importance, we shall, for the sake of our unlearned readers, transcribe an excellent account of this whole matter from the very learned Schultens.

"The Cuphic characters, says he, which had been brought from the region of the Chaldeans to the province of Hejaz, and to Mecca its capital, in the age of Mohammed, was employed by the Koreishites, and in it the koran was first written. But as this character was rude and clumsy, in consequence of its size, and ill calculated for expedition, Abauli Ebn Mocla devised a more elegant and expeditious one. This person was visir to Arradius the 41st caliph, who began to reign in the year of the hegira 322. Accordingly, in the 10th century, under this emperor of the Saracens, the form of the Arabian alphabet underwent a change; and the former clumsy embarrassed character was made to give way to the polished, easy, and expeditious type. Regarding this expedition alone, the author of the invention left very few vowel characters; and as the Hebrew manner of writing admits five long ones and five short in different shapes, he taught how to express all the vowels, both long and short, suitably to the genius of the language, by three, or rather by two, small points, without any danger of a mistake: an abbreviation truly deserving applause and admiration; for by placing a very small line above $\overset{\cdot}{\text{a}}$ he expressed *a* and *e*; and by placing the same below $\underset{\cdot}{\text{a}}$ he meant to intimate *i* only. To the other short

ones, *o* and *u*, he assigned a small *waw* above. In order to represent the long ones, he called in the *matres lectionis*, the "quiescent letters $\text{א, ב, ג, ד, ה, ו, ז, ט, י, ק, ל, מ, נ, ס, ע, פ, צ, ת}$;" so that *phata* with *elif* intimated *a* and *o* long, *i. e.* *kametz* and *cholem*; *jod* placed after *kefram* became *tzeri* and *chirek* long. *Waw* annexed to *damma* made *schurek*."

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In this passage, this great orientalist acknowledges that the visir above-mentioned, who carried the Arabian alphabet to the pinnacle of perfection, invented and annexed the vowel points for the sake of ease and expedition in writing; from which we may infer, that prior to the tenth century the Arabians had no vowel points; and consequently either read without vowels, or contented themselves with the *matres lectionis* above-mentioned.

The design of the author of the invention in fabricating these points, was confessedly ease and expedition in writing; a circumstance which furnishes a violent presumption that the Hebrew vowel-points were devised and annexed at some late period for the very same purposes.

Some, indeed, have gone so far as to affirm that the Arabians were the original fabricators of the vowel-points. "The Arabians§ (says the learned Dr Gregory Sharp) were the original authors of the vowel-points. They invented three, called *fatba*, and *damma*, and *kefra*: but these were not in use till several years after Mohammed; for it is certain that the first copies of the koran were without them. The rabbis stole them from the Arabs." This, however, is carrying the matter too far, since it is certain that the Jews were acquainted with the points in question long before the period above-mentioned.

§ Diff. on
the Origin
and Const. of
Lang. &c.

Though it is none of our intention to enter into a minute detail of the peculiarities of this noble language, we cannot omit observing one thing, which indeed belongs to grammar, but is not generally taken notice of by the Arabic grammarians. The roots of verbs in this dialect are universally triliteral; so that the composition of the 28 Arabian letters would give near 22,000 elements of the language. This circumstance demonstrates the surprising extent of it: for although great numbers of its roots are irrecoverably lost, and some perhaps were never in use; yet if we suppose 10,000 of them, without reckoning quadrilaterals to exist, and each of them to admit only five variations, one with another, in forming derivative nouns, the whole language would then consist of 50,000 words, each of which may receive a multitude of changes by the rules of grammar.

34
Surprising
extent of
the Arabic
language.

Again, the Arabic seems to abhor the composition of words, and invariably expresses very complex ideas by circumlocution; so that if a compound word be found in any dialect of that language, we may at once pronounce it of foreign extraction. This is indeed a distinguishing feature in the structure of this tongue, as well as of some of its sister dialects. This circumstance has, in our opinion, contributed not a little to the amazing fecundity of that language: for as every ingredient in the composition of a complex idea requires

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(a) See this whole detail in Dr Pocock's *Specim. Hist. Arab.* p. 250. et seq.

(c) *Irak*, "Babylonia," from *Erech*, one of the cities built by Nimrod. The Arabians have generally restored the ancient names of places. Thus with them Tyre is *Tzur*, Sidon *Seyd*, Egypt *Mezri*, &c.

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a word to express it, as many words became necessary to complete the language as there were simple ideas to be intimated by discourse. Were all the compounds of the Greek language to be dissolved, as probably once they were, the vocables of that tongue would infinitely exceed their present number.

* Poets's
Specimen.

The Arabic authors boast most unconscionably of the richness and variety of their language. No human understanding, say they, is capacious enough to comprehend all its treasures. Inspiration alone can qualify one for exhausting its sources *. Ebn Chawalab, a most renowned grammarian of theirs, has spent a whole volume upon the various names of the lion, which amount to 500; another on the names of the serpent, which make up 200. Mohammed al Firancabodius affirms that he wrote a book on the usefulness and different denominations of honey, in which he enumerates 80 of them; and after all, he assures us that he was still far from having exhausted his subject. To excel in a language so amazingly copious, was certainly a proof of uncommon capacity, and considered as no mean talent even among the Koreishites. Hence Mohammed, when some people were expressing their admiration of the eloquence of the koran, told them that he had been taught by the angel Gabriel the language of Ishmael, which had fallen into desuetude.

55
Oratory
and poetry
of the
Arabs.

In a language so richly replenished with the choicest and most energetic terms, both oratory and poetry were cultivated with ease. All the difficulty consisted in making a choice among words and phrases equally elegant. We may compare one of those poets or orators to a young gentleman, of a taste highly refined, walking into a repository where a profusion of the richest and most elegant dresses are piled up in wild confusion. Our beau is here distressed with variety; but to be able to choose the most handsome and most becoming, he must have received from nature a superior good taste; which he must likewise have cultivated by assiduous industry, and by associating with the most genteel company.

The orations of the Arabs were of two kinds, metrical and prosaic. The former they compared to pearls set in gold, and the latter to loose ones. They were ambitious of excelling in both; and whoever did so, was highly distinguished. His success in either of those departments was thought to confer honour, not only on his family, but even on his tribe. In their poems were preserved the genealogies of their families, the privileges of their tribes, the memory of their heroes, the exploits of their ancestors, the propriety of their language, the magnificence of banquets, the generosity of their wealthy chiefs and great men, &c. After all, we cannot avoid being of the unpopular opinion, that this mighty parade of eloquence and poetry did not reach backward above two centuries before the birth of Mohammed, as it certainly vanished at the era of the propagation of his religious institutions. The two succeeding centuries were the reigns of superstition and bloodshed. The voice of the mules is seldom heard amidst the din of arms.

The ancient Arabs, at whatever time poetry began to be in request among them, did not at first write poems of considerable length. They only expressed themselves in metre occasionally, in acute rather than harmonious strains. The Proverbs of Solomon, and

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the book of Ecclesiastes seem to be composed in this species of versification. The prosody of the Arabs was never digested into rules till some time after the death of Mohammed; and this is said to have been done by Al Khalti al Farabidi, who lived in the reign of the caliph Karan of Raschid.

After so many encomiums on the copiousness of the Arabic tongue, one class of our readers may possibly expect that we should subjoin a brief detail of its genius and character; and this we shall do with all possible brevity.

56
Genius and
character
of the lan-
guage.

All the primary or radical words of the language are composed of different combinations of consonants by triads; so that the various combinations and conjunctions of radicals make more than 10,000, even without including those which may arise from the meeting of guttural letters. From this quality of the language has flowed that stability of the dialect which has preserved it pure and entire for so many thousand years, and secured it from those changes and that fluctuation to which most other tongues are subject.

Perhaps, notwithstanding its copiousness and variety, no other language can vie with the one in question in point of perspicuity and precision. It is possessed of a brevity and rotundity which, amidst the greatest variety, enables it to express with clearness and energy what could not be expressed in any other tongue without tedious circumlocutions. To this purpose we shall beg leave to transcribe a passage from Bishop Pocock's oration on the Arabic language. As we imagine few of our readers who will have the curiosity to peruse this article can be unacquainted with the Latin tongue, we shall give it as it stands in the original, without a translation:

"Neque in nulla certe laudis parte, mira illa qua, non solum verborum in significando, perspicuitate, sed in prolatione, elegantiz et dulcedini caverunt, sedulitas; quoque, non solum accurata, inter literas ex significata proportionem, sensus vel intentioni, vel remissioni, prout res postulat, literarum appositionem, subductionem, vel juxta organorum, rationem prospexerunt; sed et ne quid delicatulis auribus ingratum, ne quid horridum, aut ~~arabum~~, reperiatur, effecerunt. Hoc in genere est, quod nusquam in verbo aliquo, genuinæ apud Arabes originis, concurrunt, non intercedente vocalis alicujus motione consonantes, cum vel tres, vel plures, aliis in linguis frequenter colliduntur. Immo neque, si adsint, quæ asperitati remedio sint vocales, quas libet temere tamen committunt consonantes; sed ita rei natura postulat, ut concurrere debeant illa, quæ se invicem, sine asperitatis inductione consequi, et inter se connecti non possunt; illi vel situs, vel literarum mutatione, eas abiciendo, inferendo, emolliendo, aliisve quibus possent modis, remedia quæerunt; adeo ab omni, quod vel absens, vel dissonum est, abhorrent. Quod si nobis seculis videntur, et asperis sonare ab Arabibus prolata, illud auribus nostris, et utui, non lingue imputandum, nec mollius illis sonare nostra, quam eorum nobis censendum. Quin et gutturalium, quæ nobis maxima asperitatis causa videntur, absentium, ut magnum in lingua Græca defectum, arguant Arabes."

The learned Dr Hunt, late professor of the Hebrew and Arabic languages at Oxford, is of the same opinion with the very learned prelate, part of whose ora-

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Language.

tion we have transcribed above, with respect to the delicacy and elegance of the Arabian language:—
“Nusquam, mihi credite, (inquit ille) auribus magis parcitur quam in Arabia; nulla lingua a *κατορθωτα*, alienior quam Arabica. Quamquam enim nonnullæ ejus literæ minus fortasse suaviter, immo durius etiam sonuerint, ita tamen Arabes eas temperarunt cum lenibus, duras cum molilibus, graves cum acutis miscendo, voces inde non minus auribus jucunde, quam pronuntiatio faciles conferrent, totique sermoni miram sonorum tam dulcedinem quam varietatem addiderint. Quo! quidem orationis modulandæ studium in Corano adeo manifestum est, ut primi illiusmodi oppugnatores eum libris magica ideo arte scriptum dixerint. Non auribus tantum gratus est Arabismus, sed et animi conceptibus exprimendis aptus, sonos suos sententiis semper accomodans, et felici verborum junctura eorum naturam depingens.”

To these we might add quotations from Erpenius's oration on the same subject, from Golius, Schultens, Hottinger, Bochart, and Sir William Jones; besides a whole cloud of oriental witnesses, whose extravagant encomiums would rather astonish than edify the far greater part of our readers. These panegyrics may perhaps be in some measure hyperbolic; but in general we believe them pretty well founded. At the same time we are convinced that the Arabic, however melodious in the ears of a native, sounds harsh and unharmonious in that of a European.

57
Difficult
of acquiring
a thorough
knowledge
of it.

When we consider the richness and variety of the Arabic tongue, we are led to conclude, that to acquire a tolerable degree of skill in its idioms, is a more difficult task than is generally imagined; at least some people who have acquired the knowledge of the Greek and Latin, and likewise of the more fashionable modern languages, with facility enough, have found it so. Be that as it may, there are two classes of men who, in our opinion, cannot handsomely dispense with the knowledge of that almost universal tongue: the gentleman, who is to be employed in the political transactions of the most respectable mercantile company upon earth, in the eastern parts of the world; and the divine, who applies himself to investigate the true purport of the sacred oracles: without this, the former will often find himself embarrassed in both his civil and mercantile negotiations; and the latter will often grope in the dark, when a moderate acquaintance with that tongue would make all sunshine around him.

Bochart, Hottinger, Schultens, Pocock, Hunt, and Robertson, &c. have taken wonderful pains, and lavished a profusion of learning, in proving the affinity and dialectical cognation between the Hebrew and Arabic. Much of this labour, we think, might have been spared. We presume to affirm, that no person tolerably versed in both languages can read a single paragraph of the Arabic version of the New Testament, or indeed of the Koran itself, without being convinced of the truth of this position: it is but stripping the latter of its adventitious frippery, and the kindred features will immediately appear.

The learned professors of the university of Leyden were the first who entered upon the career of Arabian learning. To them the European students are prin-

cipally indebted for what knowledge of that language they have hitherto been able to attain. Though several Italians have contributed their endeavours, yet the fruit of their labours has been rendered almost useless by more commodious and more accurate works printed in Holland.

The palm of glory, in this branch of literature, is due to Golius, whose works are equally profound and elegant; so perspicuous in method, that they may always be consulted without fatigue, and read without languor. Erpenius's excellent grammar, and his memorable dictionary, will enable the student to explain the history of *Taimur* by *Ibni Arabshah*. If he has once mastered that sublime work, he will understand the learned Arabic better than most of the Khatabs of Constantinople or of Mecca.

The Arabian language, however, notwithstanding all its boasted perfections, has undoubtedly shared the fate of other living languages; it has gradually undergone such considerable alterations, that the Arabic spoke and written in the age of Mohammed may be now regarded as a dead language: it is indeed so widely different from the modern language of Arabia, that it is taught and studied in the college of Mecca just as the Latin is at Rome.

The dialect of the Highlands of Yemen is said to have the nearest analogy to the language of the Koran, because these Highlanders have little intercourse with strangers. The old Arabic is through all the East, like the Latin in Europe, a learned tongue, taught in colleges, and only to be acquired by the perusal of the best authors.

“*Ut folia in sylvis pronos mutantur in annos, &c.*”

SECT. III. Of the Chaldean, Phœnician, Ethiopian or Abyssinian, and Egyptian Languages.

As there is a very strict connection and dialectical analogy among these languages, we have arranged them all under one section; especially since what is observed relating to one of them may, without the least straining, be extended to them all. We shall begin with the Chaldaic.

58
Connection
of the
Chaldean,
Phœnician,
Ethiopic,
and Egyptian
languages.

The Chaldeans, or Chasidim, as they are always called in Scripture, were the descendants of Chesed the son of Nahor, the brother of Abraham. The descendants of this patriarch drove the Cushim or Arabians out of Babylonia, and possessed themselves of that country at a very early period. As these Chasidim or Chaldeans were the posterity of Nebor, the descendant of Heber, they undoubtedly spoke the original Hebrew tongue as well as the other branches of that family. But being an ingenious inventive people, they seem to have polished their language with much care and delicacy of taste.

The only genuine remains of the ancient Chaldaic language are to be found in the Hebrew Scriptures; and those are contained in 268 verses, of which we have 200 in Daniel, reaching from verse 4th chapter 2d to chapter 8th exclusive; in Ezra 67, in chapter 4th, 17 verses; chapter 5th, the same number; chapter 6th, 18 verses; and in chapter 7th, 15: in Jeremiah, chapter 10th, there is extant only one verse. From these fragments, compared with the Hebrew

brew

Chaldean Language, &c.

Chaldean Language, &c.

brew, it plainly appears, that the difference between that language and the Chaldaic is scarce equal to that between the Doric and Ionic dialects of the Greek.

Whatever might have been the form of the most ancient Chaldaic letters, it is generally known that the beautiful square characters, in which the Hebrew Scriptures began to be written after the age of Ezra, were current among them at an era prior to the Babylonish captivity. Those elegant characters were probably the invention of the Chaldean academies, which were established in various parts of that extensive and fertile country.

The Chaldean declensions and conjugations differ so little from the Hebrew modifications, that it would be almost superfluous to dwell upon them in this section. The most effectual way to acquire an idea of the ancient Chaldaic, is to decompound the names confessedly of that dialect, which occur in many places of Scripture. By this method of proceeding, its beautiful structure and expressive energy will be readily comprehended even by the most illiterate classes of our readers. At the same time, we must observe, that the Chaldaic and ancient Syriac bore so near a resemblance to each other, that they have generally been classed under one head.

The first Chaldaic word that occurs in the Old Testament is *bara* "creavit". This word has all along been assigned to the language under consideration; for what reason, we confess we are not able to discover. The greatest part of the Hebrew tongue is now lost. The words *bar*, "a son," and *bara* "creavit," (rather *filii* *avit*), may probably be of that number. Another Scripture word which is often quoted, and always ascribed either to the Syriac or Chaldaic, is *igar* or *jegar* *sahadutha*, which signifies "a monument of witnesses." Every body knows, that when Jacob and Laban made their compact, the latter denominated the heap of stones reared upon that occasion in this manner; while the former called it *Galeed*, as we now write and pronounce it. This pronunciation, however, does not appear to us altogether genuine. The word is probably compounded of *gal*, *cumulus*, "a heap," and *chad*, *eternitas*, *seculum*, "eternity, an age:" so that *galchad*, or *galaad* as it came to be written afterwards, signified an "everlasting heap." Laban then had respect to the end for which the monument was erected; but Jacob alluded to its duration. It appears, however, upon this and every other occasion, when Chaldaic words are mentioned, that *ka*, *a*, was a favourite letter both with the Syrians and Chaldeans. We may likewise observe, that the same people always changed the Hebrew *shin* into *thau*, in order to avoid the serpentine sound of that consonant.

The Chaldaic names of gods, men, places, &c. which occur in Scripture, appear to be no other than Hebrew polished and improved. *Bel*, *Belus* in Latin, is evidently *baal*, or we think rather *bechel*. The Phœnicians, and sometimes the Hebrews, used it to signify the most high. The Chaldeans used their word *Bel* for the same purpose; and because this word originally imported the *High One*, they dignified their first monarch with that name. They denominated their capital city *Ba-Bel*, which imports the temple of *Bel*, and afterwards *Babylon*, which intimates the abode or dwelling of our lord the sun. *Neb* was a name of the

moon among the Babylonians, derived from the Hebrew *nabab*, *vaticinari*, "to prophecy." *Azer* was the planet Mars, from *azer* or *Ezur*, *accinxit*, "to gird," alluding to the girding on of arms. *Abad* was an Assyrian name of the sun*, a word deduced from the Hebrew *abad*, *unus*, "one." *Netzar* was the name of an Arabian idol[†], which often occurs in the composition of Babylonian names. In Arabic it signifies an eagle: we think, however, that the word is the Hebrew *netzar*, *custodiuit*, *servavit*, "to keep, to preserve." To these names of deities many more might be added, which the nature of our design will not allow us to mention.

Almost all the Chaldean proper names which occur either in sacred or profane history are evidently of Hebrew original, or cognate with that language. We shall subjoin a few examples: *Nabonassar* is evidently compounded of *Nabo* and *nazur*, both Hebrew words. *Nabopolassar* is made up of *Nabo-Pul*, the same with *Bel*, and *Azer* or *Azor*, above explained. *Beleſis* is made up of *Bel* and *Eſhu*, "fire." *Nebuchadnezzar*, *Belshazzar*, *Beltihazzar*, *Neriglissar*, *Nebuzaradan*, *Rabmag*, *Rabſaris*, *Nergal Sharezer*, *Rabthakeh*, *Ezrahaddon*, *Merodach*, *Evil Merodach*, and numberless others, are so manifestly reducible to Hebrew vocables, when decompounded, that the oriental scholar will readily distinguish them.

Names of places in the Chaldaic are likewise so nearly Hebrew, that nothing but the dialectical tone separates them. Thus *Ur* of the Chaldeans is actually *ur* *light*, that city being sacred to the sun; *Sippora* is plainly the Hebrew word *Zipporah*; *Carchemiſh*, a city on the Euphrates, is evidently compounded of *Kir* or *Kar* "a city," and *Chemſh*, a name of the sun. In short, every Chaldean or old Syrian word now extant, without any difficulty, bewray their Hebrew original. As for their dialectical differences, these we remit to the Chaldaic and Syriac grammars and lexicons.

We now proceed to the consideration of the Phœnician language, which is known to have been that of the ancient Canaanites. That this was one of the original dialects, and consequently a cognate of the Hebrew, is universally acknowledged. Instead therefore of endeavouring to prove this position, we may refer our readers to the works of the learned Mr Bochart, where that author has in a manner demonstrated this point, by deriving almost all the names of the Phœnician colonies from the Hebrew, upon the supposition that the dialect of those people was closely connected with that tongue. St Augustine, *de Civitate Dei*, has observed, that even in his time many of the vulgar in the neighbourhood of Carthage and Hippo spoke a dialect of the old Punic which nearly resembled the Hebrew. Procopius, *de bello Gath.* informs us, that there existed even in his days in Africa a pillar with this inscription in Hebrew, "We flee from the face of Joshua the robber, the son of Nun." The names of all the ancient cities built by the Carthaginians on the coast of Africa are easily reducible to a Hebrew original. The Carthaginian names of persons mentioned in the Greek and Latin history, such as Himilco, Hamilcar, Asdrubal, Hannibal, Hanno, Dido, Anna or Hannah, Sophonisba, Gisgo, Maharbal, Adherbal, &c. all breathe a Hebrew extraction.

The Greeks borrowed a great part of their religious worship from the people of whose language we are treating; of consequence, the names of most of their gods are Phœnician. Almost every one of these is actually Hebrew, as might easily be shown. The names of persons and places mentioned in the fragments of Sanchoniathon, preserved by Eusebius, are all of Hebrew complexion. The names mentioned in the Hebrew scriptures of places which belonged to the Canaanites prior to the invasion of the Israelites under Joshua, are as much Hebrew as those which were afterwards substituted in their stead. The Punic scene in Plautus has been analysed by Bochart and several other learned men, by whom the language has been clearly proved to be deduced from the Hebrew, with some dialectical variations.

The island of Malta (Melita now) was inhabited by a colony of Phœnicians many ages before the Moors took possession of it. Among the vulgar of that island many Punic vocables are current to this day, all which may be readily traced up to the Hebrew fountain. To these we may add many inscriptions on stones, coins, medals, &c. which are certainly Phœnician, and as certainly of Hebrew extraction. We have thrown together these few hints without pursuing them to any great length, as we deemed it unnecessary to dwell long on a point so hackneyed and so generally acknowledged.

62
Origin of
the Ethiop-
ians.

Before we proceed to treat of the ancient language of the Ethiopians, we find ourselves obliged to hazard a few strictures on the origin of that ancient nation. If we can once settle that single point, the discovery will open an avenue to their primitive dialect, the article about which we are chiefly concerned in the present discussion.

In our Section concerning the Hebrew language, we were led often to mention the patriarch Cush the eldest son of Ham. The posterity of this family-chief, under his son Nimrod, possessed themselves of Shinar, afterwards denominated *Chaldea*. These were probably the Arabians whose kings (according to Eusebius, Africanus, and other ancient chronologers) reigned in Babylon during several successive generations. Those were the Cushim or Cushites, whom the learned Mr Bryant has conducted over a great part of the world, and to whose industry and ingenuity he has ascribed almost all the inventions, arts, sciences, laws, policy, religions, &c. which distinguished mankind in the earliest ages.

In process of time, the posterity of Chafid or Chafed, called *Chafdim* or *Chafidim* in the east, and *Chaldeans* in the west, drove out the Cushim, and seized upon their country. The Cushim retired westward, and spread themselves over that part of Arabia situated towards the south-east. They probably extended themselves over all the eastern part of that peninsula from the sea to the wilderness between Arabia and Syria. Those were the Ethiopians mentioned in Scripture by a very unpardonable inadvertency of our trans-

lators. These, then, we think, were the primitive Cushim.

Chaldean
Language,
&c.

Josephus informs us*, that all the Asiatics called the Ethiopians of Africa by the name of *Cushim*. This denomination was not given them without good reason: it imports at least, that they deemed them the descendants of Cush; it being the constant practice of the orientals in the early ages to denominate nations and tribes from the name of their great patriarch or founder. The name *Cushim* must then have been given to the Ethiopians; from a persuasion that they were the progeny of the son of Ham who bore that name. By what route soever the Cushim penetrated into that region of Africa which was called by their name, it may be taken for granted that they were the descendants of Cush above mentioned.

It has been observed above, that the posterity of Cush possessed the country of Shinar or Chaldea at a very early period, but were expelled by the Chafidim or Chaldeans. Upon this catastrophe, or perhaps somewhat later, a colony from the fugitive Cushim transported themselves from the south and south-east coast of Arabia over the sea, which lies between that country and Ethiopia. However imperfect the art of navigation might be in that age, the distance was so small that they might easily enough make a voyage cross that narrow sea in open boats, or perhaps in canoes. However that may have been, it cannot be doubted that the tribes on both sides of that branch of the sea were kindred nations.

If, then, both the northern and southern Cushim sprung from the same stock, there can be no doubt that both spoke the same language. The language of the Babylonian Cushim was Chaldaic, and of consequence that of the Ethiopian Cushim was the same. We may therefore rest assured, that whatever changes the Ethiopian dialect may have undergone in the course of 3000 years, it was originally either Chaldaic, or at least a branch of that language. Scaliger informs us, that the Ethiopians call themselves Chaldeans; and that, says he, not without reason, because of those many sacred and profane books which are extant among them, the most elegant and most beautiful are written in a style near that of the Chaldean or Assyrian. Marianus Victorius, who was the first that reduced the Ethiopic tongue to the rules of grammar, tells us in his *Proæmium*, "that the Ethiopians call their tongue Chaldaic; that it springs from the Babylonian; and is very like the Hebrew, Syriac, and Arabic: At the same time (he concludes), that this language may be easily learned by those who are masters of the Hebrew." The learned Bochart, and Bishop Walton in his *Proleg.* are clearly of the same opinion.

63
Their lan-
guage ori-
ginally
Chaldean.

The vulgar letters of the Ethiopians, according to Diodorus Siculus, were the same with the sacred characters of the Egyptians (n). From this account, if the Sicilian may be trusted, the sacred letters of these people, concerning which so many wise conjectures

(n) We find the same observation confirmed by Heliodorus (*Ethiop. lib. x. p. 476.*) "The royal letters of the Ethiopians (says he) were the sacred characters of the Egyptians." Cassiodorus likewise assures us, "That the letters inscribed upon the Egyptian obelisks were Chaldeans." See Sect. *Shanferit*.

Chaldean
Language,
&c.

65
Modern E-
thiopic
tongues,

The Ethiopic alphabet consists of 26 letters, each of which, by a *virgula* or point annexed, varies its sound. There are 66 such points, which, when annexed to the 26 letters, form as it were 62 distinct letters. At first they had but 25 of these original letters, the Latin P being wanting; so that they were obliged to substitute another letter in its place. *Paulus*, for example, they call *Taulus*, *Aulus*, or *Caulus*: *Petros*, they pronounced *Ketros*. At last they substituted T, and added this to the end of their alphabet; giving it the force of P, though it was really a repetition of a character rather than the invention of a new one. Besides these, there are 20 others of the nature of diphthongs; but some of them are

are

(F) A very learned German, who published a grammar and dictionary of the Geez in folio.

Chaldean
Language,
&c.

are probably not of the same antiquity with the letters of the alphabet, but have been invented in later times by the scribes for convenience.

The Amharic, during the long banishment of the royal family in Shoa, became the language of the court, and seven new characters were of necessity added to answer the pronunciation of this new language; but no book was ever yet written in any other language than *Geez*. There is an old law in the country, handed down by tradition, that whoever shall attempt to translate the Holy Scripture into Amharic or any other language, his throat shall be cut after the manner in which they kill sheep, his family sold to slavery, and their houses razed to the ground.

Before we leave this subject, we may observe, that all the ancients, both poets and historians, talk of a double race of Ethiopians; one in India, and another in Africa. What may have given rise to this opinion it is not easy to discover. Perhaps the swarthy complexion of both people may have led them to this sentiment. Eusebius indeed informs us*, that "a numerous colony of people emigrated from the banks of the Indus, and crossing the ocean, fixed their residence in the country now called Ethiopia." For our part, we are rather inclined to believe that the original Ethiopians transported themselves into India, and there perhaps co-operated with the Egyptians in digging the excavations and framing the statues, some of which are still to be seen in that country, and which we have mentioned in another Section. The Greeks called those people *Aἰθίοπες*, *Æthiopes* we believe, from their sun-burnt countenance; but indeed they were very little acquainted either with the country or its inhabitants.

67
Ancient
language
of Egypt a
sister dia-
lect of
Hebrew.

The most ancient name of Egypt was *Mizraim*, of consequence the Arabians still call it *Mesri*. It was likewise distinguished by other names, such as *Oceana*, *Aeria*, &c. It appears from the sacred historian, that it was inhabited by the descendants of Mizraim the second son of Ham. Mizraim had several sons, who, according to the Scripture account, settled respectively in that country. If we trust to the sacred records, there will be little difficulty in ascertaining the language of the Mizraim. It will appear to be one of the sister dialects of the Hebrew, Phœnician, Arabic, Chaldaic, &c.; and this, to us, appears to be the fact. But the origin of that people, their language, religion, laws, and institutions, have been so warped and confounded, both by their own historians and those of other countries, that one is scarce able to determine what to believe or what to reject. Herodotus, Diodorus Siculus, Strabo, Ptolemy, and most other ancient geographers and historians, are universally agreed, that Egypt, at least that part of it called *Delta*, was overflowed by the sea, and consequently uninhabitable for many centuries after the dispersion of mankind. When we consider the low situation of the Delta, and the violent current of the tide from the coast of Phœnicia and Palestine towards that shore, we would be almost tempted to adopt this hypothesis; but the sa-

cred records avouch the contrary. According to them, we find Egypt a populous, rich, and flourishing kingdom, as early as the age of Abraham. Had the Lower Egypt been a pool of stagnating water at any time after the general deluge, we think it could not have been drained, cleared, cultivated, and stocked with inhabitants, so early as the days of Abraham.

Chaldean
Language,
&c.

Diodorus Siculus, however, is positive that the Egyptians were a colony of Ethiopians; and this he endeavours to prove by the similarity of features, customs, laws, religious ceremonies, &c. between the two nations. That there was a constant intercourse of good offices between these two branches of the Hamites, cannot be questioned; and that they nearly resembled each other in many respects, is too evident to admit of contradiction. The excavations, originally dug out of the solid rocks of porphyry and marble, in which the natives resided before the plains were drained, have been observed by a most judicious traveller (G) very few years ago. At the same time, the most accurate and judicious travellers (H) who have visited that region in modern times, are generally of opinion that the land has gained nothing on the sea since the period when Herodotus wrote his description of that country; from which circumstance we may be led to conclude, that the idea of the inundation of the Delta is not founded in fact.

But even admitting that the Egyptian Delta has acquired nothing from the sea since the age of Herodotus to the present, it certainly does not follow that the region in question was never overflowed by that element; since there are, in many parts of the globe, large tracts of land, certainly once covered with sea, which have continued to this day in the very same situation in which they were 2000 years ago. We leave the decision of this point to the judgment of our readers.

We have already hinted our opinion of the nature of the Egyptian language; but because Egypt is generally thought to have been the native land of hieroglyphics, and because many are of opinion that hieroglyphical characters were prior to alphabetical, we shall hazard a few conjectures with respect to that species of writing.

The end of speech, in general, is to enable men to communicate their thoughts and conceptions one to another when present; the use of writing is to perform the same office when people are at so great a distance that vocal sounds cannot mutually reach them. Hieroglyphics are said to have been invented to supply this defect. The most ancient languages were everywhere full of tropes and figures borrowed from sensible objects. As in that stage of society men have not learned to abstract and generalize, all their ideas are borrowed from such objects as most forcibly strike their senses. This circumstance would naturally suggest to savages the idea of conveying their sentiments to each other, when absent, by delineations of corporeal objects. Thus, if a savage asked a loan of his friend's

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Egyptian
hierogly-
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(G) See Mr Bruce's Travels, Vol. I.

(H) Mr Bruce, Dr Shaw, Bishop Pocock, Savary, Volney, &c.

friend's horse, he might find means to have conveyed to him the figure of that animal; and so of others. This was the very lowest species of ideal communication, and has been styled *picture-writing*.

Necessity would soon impel our savage correspondents to fabricate a method more extensively useful, which would likewise be suggested by the constant use of the metaphorical mode of speech. Some savage leader, more sagacious than the vulgar herd, would observe that certain sensible objects were fitted, according to the rules of analogy, to represent certain human passions, and even some abstract ideas; and this would be readily enough adopted by the herd as a new improvement. In this case a *horn* might be the emblem of *power*, a *sword* of *bravery*, a *lion* of *fury*, a *fox* of *cunning*, a *serpent* of *malice*, &c. By and by artificial signs might be contrived to express such ideas as could not readily be denoted by bodily objects. This might be called *symbolical writing*. Such was the foundation of the Chinese characters; and hence that prodigious number of letters of which the written language of that people is composed. Farther they could not proceed, notwithstanding their boasted inventive powers; and farther, we believe, no nation ever did proceed, who had once upon a time no other characters but hieroglyphical. The Mexicans had arrived at the very lowest stage of hieroglyphical writing, but had not taken one step towards alphabetical. The Hurons employ hieroglyphical symbols, but never entertained a single idea of alphabetical. Hieroglyphical characters are the images of objects conveyed to the mind by the organs of vision; alphabetic are arbitrary artificial marks of sound, accommodated by compact to convey to the mind the ideas of objects by the organs of hearing. In a word, we think that there is not the least analogy between these two species to conduct from the one to the other: we are therefore of opinion, that hieroglyphical characters were never the vulgar channels of ideal conveyance among civilized people.

We know that in this point we differ from many learned, judicious, and ingenious writers; some of whom have taken much pains to investigate the intermediate stages through which the fabricators of characters must have passed in their progress from hieroglyphical to alphabetical writing. These writers have adopted a plan analogous to Bishop Wilkins's project of an artificial language. In this theory, we own, we are led to suspect that they supposed all mankind were once upon a time *savages*, and were left to hammer out words, as well as characters, by necessity, ingenuity, experience, practice, &c. For our part, we have endeavoured to prove, in our section on the Hebrew language, that alphabetical writing was an antediluvian invention; and we now lay it down as our opinion, that among all those nations which settled near the centre of civilization, hieroglyphics were, comparatively, a modern fabrication.

The Orientals are, at this day, extravagantly devoted to allegory and fiction. Plain unadorned truth with them has no charms. Hence that extravagant medley of fables and romance with which all antiquity is replete, and by which all ancient history is disguised and corrupted. Every doctrine of religion, every precept of morality, was tendered to mankind in parables

and proverbs. Hence, says the Scripture, to understand a proverb, the words of the wise, and their dark sayings. The eastern sages involved their maxims in this enigmatical dress for several reasons: to fix the attention of their disciples; to assist their memory; to gratify their allegorical taste; to sharpen their wit and exercise their judgment; and sometimes perhaps to display their own acuteness, ingenuity, and invention.

It was among the ancients an universal opinion, that the most sacred arcana of religion, morality, and the sublime sciences, were not to be communicated to the *uninitiated rabble*. For this reason every thing sacred was involved in allegorical darkness.

Here, then, we ought to look for the origin of hieroglyphical or picture-writing among the civilized nations of the east. They did not employ that species of writing because they were ignorant of alphabetical characters, but because they thought fit to conceal the most important heads of their doctrines under hieroglyphical figures. The Egyptian priests were most celebrated for their skill in devising those emblematical representations; but other nations likewise employed them. We learn from the fragments of Berosus the Chaldean historian, preserved by Syncellus and Alexander Polyhistor, that the walls of the temple of Belus at Babylon were covered all over with those emblematical paintings. These characters were called *uſoi*, because they were chiefly employed to represent sacred objects; and *χρυσα*, because they were originally carved or engraved. Their name points to their original use. Instead of pursuing these observations, which the nature of our design will not permit, we must refer our readers to Herodotus, l. ii. Diodorus Sic. l. i. Strabo, l. xvii. Plut. Isis and Osiris; and among the Christian fathers, to Clem. Alex. Euseb. Præp. Evang.; but chiefly to Horapollon's Hieroglyphica.

From this deduction we would conclude, that this species of writing was an adventitious mode in Egypt, peculiar to the priests, and employed chiefly to exhibit things sacred; and that among all civilized people it did not supersede the use of alphabetical characters, nor did the use of the latter originate from the former. When alphabetical letters were invented, if indeed they were a human invention, they were antecedent to the other in use and extent. The Egyptian priests alone knew the true import of those sacred symbols; and communicated that knowledge first to their own children from generation to generation, then to the initiated, and last of all to the grandees of the nation, all of whom were indeed initiated. The hieroglyphics of Egypt were not then the symbols of any sacred occult language; but signs invented by the priests and prophets or wise men, in order to represent their deities, the attributes and perfections of their deities, and the mysterious arcana of their religion, and many other circumstances relating to objects of importance, which were deemed either too sacred or too important to be imparted to the vulgar.

The Egyptians ascribed the invention of letters to a person whom they called *Thoth**, *Thouth*, or *Euph. Thyoth*; the Greeks *Ἡρακλῆς*; and the Romans *Mercure*. *Prep. Ev. rius*. Plato† calls him a god, or a godlike man; † *Phædrus*. Diodorus‡ makes him privy counsellor to Osiris; San- † *Lib. i.*

Chaldean language, &c.

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Chaldean
language,
&c.
§ Prep.
Elev.

Choniathon ap. Euseb. § connects him with the Phœnician Cronus or Saturn. To this Mercury the Egyptians ascribe the invention of all the arts and sciences. He was probably some very eminent inventive genius, who flourished during the first ages of the Egyptian monarchy, and who perhaps taught the rude savages the art of writing.

72
Two kinds
of alphabetic
characters in
Egypt.
§ Lib. 1.

According to Diodorus Siculus, the Egyptians had two kinds of letters; the one sacred, the other common; the former the priests taught their own children, the latter all learned promiscuously. In the sacred characters the rites and ceremonies of their religion were couched; the other was accommodated to the ordinary business of life. Clem. Alexand. mentions three different styles of writing employed by the Egyptians. "The pupils, who were instructed by the Egyptians, first learned the order and arrangement of the Egyptian letters, which is called *epistolography*, that is, the manner of writing letters; next, the sacred character, which the sacred scribes employed; lastly, the hieroglyphic character, one part of which is expressed by the first elements, and is called *Cyriologie*, that is, *capital*, and the other *symbolic*. Of the symbolic kind, one part explains properly by imitation; and the other is written tropically, that is, in tropes and figures; and a third by certain enigmatical expressions. Accordingly, when we intend to write the word *sun*, we describe a circle; and when the moon, the figure of that planet appearing horned, conformable to the appearance of that luminary after the change." In this passage we have an excellent description of the three different modes of writing used by the Egyptians; the common, the sacred, and the hieroglyphic. The last he describes according to its three divisions, in exact conformity to our preceding observations.

73
The sacred
letters and
language
of Egypt
Chaldaic.

By the description above translated, it plainly appears, that the sacred character of the Egyptians was entirely different from the hieroglyphic; and by this consideration we are in a good measure justified, in supposing, as we have done all along, that the sacred letters of the Egyptians were actually the Chaldaic. The inscriptions on the obelisks mentioned by Cassiodorus, so often quoted, were certainly engraved in the sacred character; and the character in which they were drawn was that above mentioned. If the sacred letters were Chaldaic, the sacred language was probably the same.

The Egyptians pretended, that the Babylonians derived the knowledge of the arts and sciences from them; while, on the other hand, the Babylonians maintained, that the former had been tutored by them. The fact is, they both spoke the same language; used the same religious rites; had applied with equal success to astrology, astronomy, geometry, arithmetic, and the other sciences; of course a rivalry had arisen between the two nations, which laid the foundation of those opposite pretensions.

The most faithful specimen of the vulgar language of the Egyptians, as we believe, still preserved in the Coptic, which, however, is so rplete with Grecisms, that it must be difficult to trace it out.

Under the Ptolemies, the Greek was the language of the court, and consequently must have diffused itself over all the country. Hence, we believe, two-thirds of the Coptic are Greek words, diversified by

their terminations, declensions, and conjugations only. To be convinced of the truth of this, our learned and curious readers need only consult Christian Scholtz's Egyptian and Coptic grammar and dictionary, corrected and published by Godfred Woude, Oxford, 1753.

Chaldean
Language,
&c.

The Egyptians and Phœnicians were in a manner The Egyptian and Phœnician and the same language; that is, one of the sister dialects of the Hebrew, Chaldean, Arabian, Coptic, &c. — This is not a mere conjecture; it may be reduced by almost numberless examples. It is true, that when Joseph's brethren went down to Egypt, and that ruler designed to converse with them, they could not understand the Egyptian idiom which he spoke; nor would he, had he been actually an Egyptian, have understood them without an interpreter. The only conclusion from this circumstance is, that by this time the Egyptian had deviated considerably from the original language of mankind. The Irish and Welch, every body knows, are only different dialects of the Celtic tongue; and yet experience proves, that a native of Ireland and another of Wales cannot well comprehend each other's language, nor converse intelligibly without an interpreter. The Erse, spoken in the Highlands of Scotland, and the Irish, are known to be both branches of the old Celtic; yet a Scotch Highlander and an Irishman can hardly understand each other's speech. By a parity of reason, a Hebrew and an Egyptian might, in the age of Joseph, speak only different dialects of the same original tongue, and yet find it difficult to understand one another. The fact seems to be, the Hebrew dialect had been in a manner stationary, from the migration of Abraham to that period; whereas the Egyptian, being spoken by a powerful, civilized, and highly cultivated people, must have received many improvements, perhaps additions, in the course of near two centuries.

The descendants of Canaan and of Mizraim were The vulgar Egyptian and Phœnician and strictly connected in their religious ceremonies: they worshipped the same objects, namely, the *Hyst of Heaven*; they mourned *Osiris* and *Adonis* in concert; they carried on a joint commerce, and, we think, spoke the same language; we may, therefore, conclude, that their vulgar letters were nearly the same, both in form, disposition, and number. Their original number was probably 16, viz. five vowels, six mutes, simple and middle, four liquids, and the solitary *ay*. With these, it is likely, was joined a mark or aspiration, or an *h*, such as we have in the Roman alphabet, and find on some Greek monuments. Cadmus was originally an Egyptian; that leader brought a new set of letters into Greece. These are generally deemed to be Phœnician. They were nearly the same with the ancient Pelasgic, as will be shown in the section of the *Greek language*. The latter, we think, were from Egypt, and consequently the former must have been from the same quarter. Danaus, Perseus, Lelax, &c. were of Egyptian extraction: they too adopted the Cadmean characters, without substituting any of their own.

The Jonim, or Ionians, emigrated from Gaza, a colony of Egyptians; and their letters are known to have differed very little from those of Cadmus and the Pelasgi.

74
The Egyptian
and Phœnician
languages
the same.

75
The vulgar
Egyptian and
Phœnician
languages
nearly the
same with
the Hebrew
and Phœnician.

Chaldean
language,
&c.

Pelafgi. The conclusion, therefore, is, that the vulgar Egyptian letters were the same with the Phœnician.

We are abundantly sensible that there are found upon Egyptian monuments characters altogether different from those we have been describing. At what time, by what people, and to what language, these letters belonged, we will not pretend to determine. The Ethiopians, the Chaldeans, the Persians, the Greeks, the Romans, the Saracens, have, at different times, been sovereigns of that unhappy country. Perhaps other nations, whose memory is now buried in oblivion, may have erected monuments, and covered them with inscriptions composed of words taken from different languages, perhaps, upon some occasions, whimsically devised, with a view to perplex the curious antiquaries of future ages. Some of these are composed of hieroglyphics intermingled with alphabetical characters, artificially deranged, in order to render them unintelligible. These we do not pretend to develop; because the most inquisitive and sagacious antiquaries are not yet agreed as to their purport and signification.

76
Egyptian
names of
Hebrew
original,

We shall now go on to show, that most part of the names of persons and places, &c. which have been conveyed down to us, may, in general, be reduced to a Hebrew, Phœnician, Syrian, or Chaldean original. As the first of these languages is most generally known, we shall employ it as our arch-type or standard, beginning with those terms which occur in Scripture.

The word *Pharaoh*, the title of the *melech* or king of Egypt, is, we think, compounded of two terms, which plainly discover a Hebrew original. According to an oriental tradition, the first who assumed this title was the sovereign of the *royal shepherds*; a race of people from Arabia and Phœnicia. They conquered Egypt at an early period, and kept possession of it for several centuries. They gloried in the title *shepherd*, or *king*, which, according to Josephus *con. Apion*, signifies "royal shepherds." The word *Pharaoh* seems to be compounded of *Phar*, "a bullock," and *Rachab* "to feed;" hence *Pharachab*, as we think it ought to be written. The name given to Joseph is evidently of kin with the Hebrew; for *zaphnath* differs very little from the Hebrew verb *tzaphan*, which signifies "to hide, to keep secret;" *Pancab* or *Phancab*, signifies much the same with the Hebrew *Phanab*, *aspexit*: so that the name actually intimates one who sees hidden things; which was certainly the very idea the prince intended to convey by giving him that name.

Potiphar, or *Potipherah*, the name of Joseph's father-in-law, has likewise a dialectical affinity with the Hebrew idiom. In that language *Putab* signifies "to open, to explain," which was one part of the sacerdotal office; and *Phar* imports "a bullock." Potiphar was then priest of the bullock, that is, the ox, *apis*, sacred to the *sun* (1). This person was priest or prince of *On*, which, according to Cyrillus on Hosea, was an Egyptian name of that luminary. The He-

brew word *hon* or *chon* signifies "power, wealth, sufficiency;" a very proper epithet for the *sun*, who was thought to bestow those blessings. The name of Joseph's wife was *Asenath* or *Afnath*, compounded of *Ishab* "a woman," and *Naibh* or *Neit*, an Egyptian name of "Minerva, a votary of Minerva."

Almost all the names of cities belonging to Egypt which are mentioned in Scripture are evidently Hebrew. To be satisfied as to this position, our curious readers may consult Jamieson's *Spicilegia*, an excellent book very little known. The names of most of the Egyptian deities are significant in the Hebrew tongue, and in that dialect the names appear to have been imposed with great judgment and propriety, plainly indicating some office assigned them, or pointing to some peculiar attribute. We shall produce a few instances.

Chaldean
Language,
&c.

77
And signifi-
cant in that
language.

Osiris was the great divinity of Egypt; he was certainly the *sun*. The Egyptians gave their deities a variety of names in allusion to their various offices and attributes. Jablonski has in a manner wearied himself with tracing the signification of this name. In Hebrew we have *Qsir* "to grow rich, to be enriched." The *sun* may be called the great enricher of nature, and therefore might properly be called by a name alluding to that quality. *Isis* was both the moon and the earth. *Ishab* is the Hebrew word for *woman*, and Horapollon assigns this very derivation. *Anubis* was one of the names of Mercury among the Egyptians: He was always figured with the head of a *dog*. He accompanied *Isis* in her peregrinations in quest of *Osiris*, and frightened away the wild beasts from attacking the princefs. In Hebrew, *Nubab* signifies "to bark." Here the analogy, we think, is evident. Many Egyptian names begin with *Can*, such as *Canebus*, *Canopus*, &c. The Hebrew word *Cohen* or *Cohen*, *Syr*, *Con* or *Chon*, intimates both a prince and a priest. *Ob* or *Aub*, in Hebrew, imports "a bottle, a flaggon," any thing round and prominent like the human belly. In the language of Egypt it was often applied to the *sun*, in allusion to his rotundity. In the temple of *Jupiter Ammon* or *Ammon*, in the desert of Lybia, there was a statue of the god representing the *navel* of the human body, which was probably framed in allusion to this fancy. Hence the Pythoness, or people who, according to the Scripture, had familiar spirits, were said to prophecy by the inspiration of *Ob*, as the Delphic priestess did by that of *Apollo*. Again, many Egyptian names end with *siris*, as *Calaisiris*, *Termosiris*. This termination is no doubt a cognate of the Hebrew and Chaldean *sar* or *zar*, signifying "a prince, or grandee, &c." The river Nile in the Ethiopic dialect is called *Siris*; that is, we believe, the *king of rivers*. The same flood seems to derive the name by which it is generally known, from the Hebrew *nebel*, "a valley, or torrent running down a valley." The same river was often called *Oceanus*, a word composed of *ag*, or *oc*, or *oeb*, which signifies "a king, a leader," and the Hebrew *ein* "a fountain," so that the word imports the *king of fountains*. The Hebrews always denominated the land of Egypt

3 T 2

the

(1) The Septuagint (Gen. xli. v. 45 and 50.) translate *On* by ΠΑΙΣΘΑΙΣ.

78
At the
birth of
Moham-
med two
languages
prevailent
in Persia,

the land of Mizraim; the Egyptians themselves, in later times, seem to have called it *Aiyvres Egyptus*, "Egypt," which some think is compounded of *Al*, Hebrew, "an island, a country, a province," and *Copt* or *Capt*, "a famous city in that country."

From this specimen, we hope it will appear that the Egyptian language in the more early ages was one of those dialects into which that of the descendants of the postdiluvian patriarchs was divided, and perhaps subdivided, a few centuries after the deluge. Among all those, we believe, such an affinity will be found, as plainly demonstrates that they originally sprang from one common stock. Here we might easily follow the Egyptian language into Greece; and there we are persuaded we might trace a vast number of Egyptian terms into that tongue, which, however, the nature of this inquiry will not permit. If our learned readers should incline to know more of the affinity of the Egyptian tongue with the others so often mentioned, they may consult Bochart's *Chanaan*, Walton's *Proleg.* Gebelin's *Monde Prim.* Jamieson's *Spicilegia*, &c.

SECT. IV. Of the Persian Language.

THE Persian language is divided into the ancient and modern; the former of which is at this day very imperfectly known. the latter is at present one of the most expressive, and at the same time one of the most highly polished, in the world. We shall, in treating of this language, in compliance with the plan we have all along followed, begin with the ancient.

When Mohammed was born, and ANU'SHIRAVAN, whom he calls the *just king*, sat on the throne of Persia, two languages were generally prevalent in that empire (κ). The one was called *Deri*, and was the dialect of the court, being only a refined and elegant branch of the *Parfi*, so called from the province of which *Shiraz* is now the capital; and that of the learned, in which most books were composed, and which had the name of *Pahlavi*, either from the heroes who spoke it in former times, or from *pablu*, a tract of land which included some considerable cities of *Iran*: The ruder dialects of both were spoken by the rustics of several provinces; and many of these distinct idioms were vernacular, as happens in every kingdom of considerable extent. Besides the *Parfi* and *Pahlavi*, a very ancient and abstruse tongue was known to the priests and philosophers, called the language of the *zend*, because a book on religious and moral duties which they held sacred, and which bore that name, had been written in it; while the *Pazend* or comment on that work was composed in *Pahlavi*, as a more popular dialect. The letters of this book were called *zend*, and the language *avesta*.

The *Zend* and the old *Pahlavi* are now almost extinct in *Iran*, and very few even of the Guebres can read it; while the *Parfi* remaining almost pure in *Shah-namoh*, has, by the intermixture of Arabic words, and many imperceptible changes, now become a new language exquisitely polished by a series of fine writers

both in prose and verse, analogous to the different idioms gradually formed in Europe after the subversion of the Roman empire.

The very learned and laborious Sir William Jones is confident that the *Parfi* abounds with words from the *Shanscrit*, with no other change than such as may be observed in the numerous dialects of India; and that very many Persian imperatives are the roots of *Shanscrit* verbs; and that even the moods and tenses of the Persian verb substantive, which is the model of all the rest, are deducible from the *Shanscrit* by an easy and clear analogy. From this he infers that the *Parfi*, like the various idiom dialects, is derived from the language of the Bramins. This conclusion, we imagine, is not altogether just, since by the same train of reasoning we may infer that the *Shanscrit* is derived from the *Parfi*.

The same learned gentleman adds, that the multitude of compounds in the Persian language proves that it is not of Arabic but Indian original. This is undoubtedly true; but though the *Parfi* is not of Arabic original, it does not necessarily follow that it is of *Shanscrit*. We might with the same propriety, and with an equal show of reason, conclude, that the Greek language is descended of the *Shanscrit*, because it too abounds with compounds. We may then rest assured, that neither the one nor the other argument adduced by the ingenious president proves that the *Parfi* tongue is a descendant of the *Shanscrit*.

The gentleman so often mentioned, assures us, that the *Zend* bears a strong resemblance to the *Shanscrit*; which, however, it might do without being actually derived from it, since we believe every oriental scholar will find that all the languages from the Mediterranean to the utmost coast of Hindostan exhibit very strong signatures of a common original. The *Parfi*, however, not being the original dialect of *Iran* or *Persia*, we shall pursue it no farther at present, but return to give some account of the *Pahlavi*, which was probably the primitive language of the country. We have observed above, that the *Pazend* or comment on the *Zend* was composed in the *Pahlavi* for the use of the vulgar. This, according to Sir William, was a dialect of the Chaldaic; and of this assertion he exhibits the following proof.

By the nature of the Chaldean tongue, most words ended in the first long vowel, like *shem-aiá* "heaven;" and that very word, unaltered in a single letter, we find in the *Pazend*, together with *lailiá* "night," *meiá* "water," *nirá* "fire," *matrá* "rain," and a multitude of others, all Arabic or Hebrew, with a Chaldean termination; so *zamar*, by a beautiful metaphor from pruning trees, means in Hebrew to compose verses, and thence, by an easy transition, to sing them; now in *Pahlavi* we see the verb *zamarúniten* "to sing," with its terms *zamaraunemi* "I sing," and *zamazund* "he sang;" the verbal terminations of the Persian being added to the Chaldaic root. All these words are integral parts of the language; not adventitious like the Arabic nouns and verbals engrafted on modern Persian.

From

(κ) The moderns call the empire of Persia *Iran*; a name unknown to the ancients.

81
Persian
Language

From this reasoning it plainly appears, 1st, that Pahlavi was the ancient language of Persia; and, 2d, that the ancient Persian was a cognate dialect of the Chaldean, Hebrew, Arabic, Phœnician, &c. M. Anqueti has annexed to his translation of the *Zendvesta* two vocabularies in Zend and Pahlavi, which he found in an approved collection of *Rawyat* or *Traditional Pieces* in modern Persian. His vocabulary of the Pahlavi strongly confirms this opinion concerning the Chaldaic origin of that language. But with respect to the Zend, it abounded with vast numbers of pure Shanferit words, to such a degree, that six or seven words in ten belonged to that language.

82
Derived
from Chal-
dæan and
Shanferit,
&c.

From this deduction it would appear, that the oldest languages of Persia were Chaldaic and Shanferit: and that when they had ceased to be vernacular, the Pahlavi and Zend were deduced from them respectively, and the Parsi either from the Zend, or immediately from the dialect of the Brahmans: but all had perhaps a mixture of Tartarian; for the best lexicographers assert, that numberless words in ancient Persian are taken from the Cimmerians. With respect to the last of these, we cannot help being of opinion, that colonies of people from the neighbourhood of Persia did transport themselves into Crim Tartary, and perhaps into Europe. These colonists brought along with them those vocables which still occur in their dialect. Emigrants from those quarters must have found their way into Scandinavia, since numberless Persian words are still current in those regions. Perhaps Odin and his followers emigrated from the neighbourhood of Media and Persia, and brought with them the dialect of the nations from whose country they had taken their departure.

83
The Zend
from the
same
source.

With respect to the Zend, it might well be a dialect of the Shanferit, and was probably a sacred language; and if so, concealed from the vulgar, and reserved for the offices of religion. If Zoroastres, or Zaratusth as the orientals call him, travelled into Egypt, and was initiated in the mysteries of the Egyptian religion, as some pretend he was, he might be instructed in the sacred dialect of that people by the priests under whom he studied. When that philosopher returned into Persia, and became the apostle of a new religion, he might compose the volume of his laws and religious institutions in the sacred language of his Egyptian tutors. This language then became that of the Magi, who concealed it carefully from the knowledge of the uninitiated, as the priests did in Egypt and the Brahmans in Hindostan.

In our Section on the *Shanferit* language, we shall give a detail of a number of particulars, which to us seem to furnish a presumption that the language in question was imported from Egypt into Hindostan. We confess there are not sufficient data to improve these presumptions into absolute certainty; but we hope the time is at hand when the worthy members of the Asiatic Society will discover abundant materials to ascertain the truth of this position. We are the rather inclined to adopt this hypothesis, when we consider the character of Zoroastres in connection with that of the Egyptian Cohens and of the Indian Brahmans.

If this opinion should one day appear to be well-founded, we believe the coincidence between the lan-

guage of the Zend and the Shanferit will be easily accounted for, without making the Hindoos masters of Iran or Persia, and then driving them back to the shores of the Ganges. That the nations of Turan or Scythia did actually over-run that country, and make themselves masters of a considerable part of it at different times, is vouched by the records and traditions of the Persians themselves. Upon these occasions a number of Tartarian words might be introduced into the country, and acquire a currency among the inhabitants. As the annals of ancient Persia have been long since destroyed and consigned to eternal oblivion, it is impossible to ascertain either the extent or duration of these irruptions. Indeed the nature of our design does not call for that investigation.

In order to corroborate the cognation between the Chaldean and Pahlavi languages, we shall subjoin a few arguments derived from the Mosaic history, and the other writings of the Old Testament. These we believe will be admitted as irrefragable proofs of the position above advanced by such as admit the authenticity of those records.

Elam is always allowed to have been the progenitor of the Persians. This patriarch was the eldest son of Shem the son of Noah; and according to the Mosaic account, his posterity settled in the neighbourhood of the descendants of Ashur, Arphaxad, Lud, and Aram, the other sons of Shem. The country where they settled was denominated *Elymais* * as late as the beginning of the Christian era. This name was retained till the Saracens conquered and took possession of that country. If this was the case, as it certainly was, the Elamites or Persians spoke a dialect of the primary language, which, in the first Section, we have proved to have been the Hebrew.

When the four eastern monarchs invaded the five cities of the plain in Canaan †, Chedorlaomer king of Elam was at the head of the confederacy. Amraphel king of Shinar, that is Babylon or Chaldaea, was one of the allies; Arioch king of Elasar was another; and Tidal, king of some scattered nations in the same neighbourhood, was the fourth. That Chedorlaomer was principal in this expedition, is obvious from the historian's detail of the second, where that prince is placed first, and the rest are named the kings that were with him. This passage likewise demonstrates, that Elam, Shinar, and Elazar, lay contiguous, and were engaged in the same cause. Wherever the country in question is mentioned in Scripture prior to the era of Daniel and Ezra, it is always under the name of *Elam*. To go about to prove this would be superfluous.

According to Xenophon †, the Persians knew nothing of horsemanship before the age of Cyrus: but that historian informs us, that after that monarch had introduced the practice of fighting on horseback, they became so fond of it, that no man of rank would deign to fight on foot. Here it ought to be considered, that the historian above mentioned was now writing a moral, military, and political romance; and therefore introduces this anecdote, in order to exalt the character of his hero: so that we are not to suppose that the people under consideration were unacquainted with the art of horsemanship till that period.

The very name *Phars* or *Pharas* is certainly of He-

Persian
Language.

84
Proofs
from
Scripture of
the origin
of the Pahlavi.

* Strabo
lib. 11.

† Gen.
chap. xiv.

Persian
Language

brew origin, and alludes to the skill that people professed in horsemanship. The original seems to be *Phar-sab*, which "a hunt;" and in the Arabic *Pharas* intimates a *horse*, and *Pharas* a *horseman*. Consequently the people were denominated *Parfi*, and the country *Paris*, because they were trained from their infancy to ride the *great horse*, which indeed they deemed their great honour. This name was perhaps first imposed upon them by the neighbouring nations, and in process of time became their gentile appellation. *Mithras* is generally known to have been the chief divinity of the Persians; a name which is plainly derived from *Mithra* "great." We find in Strabo the Persian god *de-manas*, which is plainly a cognate of *Humah* the "sun or fire." Hence we believe comes *Humana*, the "hearth or chapel;" where the fire sacred to the sun was kept burning; which, we believe, the Greeks called *templa* or "fire temples." Herodotus* mentions a custom among the Persians, according to which, when they came to engage an enemy, they cast a rope with a kind of gin at the end of it on their enemy, and by those means endeavoured to entangle and draw him into their power. The people of Persia who employed this net or gin were called *Sagartes*, from *saraga*, *pharag*, or *serig*, a word which in Hebrew, Arabic, and Chaldaic, signifies to "lamber or entangle;" hence perhaps the Greek word *σάραξ*, a "basket or net." *Sar* or *zir* in Hebrew, Phœnician, Syriac, &c. signifies "a lord, a prince," and hence we have the initial syllable of the far-famed *zar-tusht*, *Zoroastres*. In a word, most of the Persian names that occur in the Grecian histories, notwithstanding the scandalous manner in which they have been disguised and metamorphosed by the Greeks, may still with a little skill and industry be traced back to a Hebrew, Chaldaic, Syriac, or Phœnician origin. In the books of Daniel, Ezra, Nehemiah, and Esther, we find a number of Persian names which we all of a Hebrew or Chaldaic complexion: to investigate these at much greater length would be foreign to the design of the present article. If our curious reader should incline to be more fully satisfied as to this point, he may consult Bochart's *Chanaan*, D'Herbelot's *Bib. Orient.* Walton's *Proleg.* &c.

It now appears, we hope, to the entire satisfaction of our readers, that the Pahlavi is a remnant of the old Persian, and that the latter is a cognate branch of the Hebrew, Chaldaic, Syriac, &c. We have likewise adduced some presumptive proofs that the Zend was copied from the sacred language of the Egyptians: we shall now endeavour to explain by what changes and revolutions the language first mentioned arrived at its present summit of beauty and perfection.

85
Progress of
the Persian
language.

We have observed above, that the Scythians, whom the old Persians called *Saca*, and whom the modern call *Turan*, often invaded and over-ran Persia at a very early period. The consequence was, an infusion of Scythian or Tartarian terms, with which that language was early impregnated. This in all probability occasioned the first deviation from the original standard. The conquests of Alexander, and the dominion of his successors, must, one would imagine, introduce an inundation of Greek words. That event, however, seems to have affected the language in no

considerable degree, at least very few Grecian terms occur in the modern Persian.

Persian
Language

The empire of the *Arfacide* or Parthians, we apprehend, produced a very important alteration upon the ancient Persian. They were a demi-Scythian tribe; and as they conquered the Persians retained the dominion of those parts for several centuries, and actually incorporated with the natives, their language must necessarily have given a deep tincture to the original dialect of the Persians. Sir William Jones has observed, that the letters of the inscriptions at *Istakhr* or *Persepolis* bear some resemblance to the old Runic letters of the Scandinavians. Those inscriptions we take to have been Parthian; and we hope, as the Parthians were a Tartarian clan, this conjecture may be admitted till another more plausible is discovered. The Persians, it is true, did once more recover the empire; and under them began the reign of the *Deri* and *Parfi* tongues: the former consisting of the old Persian and Parthian highly polished; the latter of the same languages in their uncultivated vernacular dress. In this situation the Persian language remained till the invasion of the Saracens in 636; when these barbarians over-ran and settled in that fine country; demolished every monument of antiquity, records, temples, palaces; every remain of ancient superstition; massacred or expelled the ministers of the Magian idolatry; and introduced a language, though not entirely new, yet widely differing from the old exemplar.

But before we proceed to give some brief account of the modern Persian, we must take the liberty to hazard one conjecture, which perhaps our adepts in modern Persian may not find themselves disposed to admit. In modern Persian we find the ancient Persian names wonderfully distorted and deflected from that form under which they appear in the Scripture, in Ctesias, Megasthenes, and the other Greek authors. From this it has been inferred, that not only the Greeks, but even the sacred historians of the Jews, have changed and metamorphosed them most unmercifully, in order to accommodate them to the standard of their own language. As to the Greeks, we know it was their constant practice, but we cannot believe so much of the Hebrews. We make no doubt of their writing and pronouncing the names of the Persian monarchs and governors of that nation nearly in the same manner with the native Persians. It is manifest, beyond all possibility of contradiction, that they neither altered the Tyrian and Phœnician names of persons and places when they had occasion to mention them, nor those of the Egyptians when they occurred in their writings. The Babylonian and Chaldaic names which are mentioned in the Old Testament vary nothing from the Chaldean original. No reason can be assigned why they should have transformed the Persian names more than the others. On the contrary, in Ezra, Nehemiah, and Esther, we find the Persian names faithfully preserved throughout.

The fact, we imagine, is this: Our modern admirers of the Persic have borrowed their names of the ancient kings and heroes of that country from romances and fabulous legends of more modern date and composition. The archives of Persia were destroyed by the Saracens: nothing of importance was written in that country till two centuries after the era of Mohammed. What succeeded was all fiction and romance.

86
Nothing
now exist-
ing in Pers-
ic, except
the Zend,
older than
the Saracen
conquest.

Persian
Language.

The authors of those entertaining compositions either forged names of heroes to answer their purpose, or laid hold on such as were celebrated in the ballads of their country, or preserved by vulgar tradition. The names were no doubt very different from those of the ancient kings and heroes of Persia; and probably many of them had undergone considerable changes during the continuance of the Parthian empire. Upon this foundation has the learned Mr Richardson erected a very irregular fabric, new, and, to use his own expression, we think built upon *pillars of ice*. He has taken much pains to invalidate the credit of the Grecian histories of the Persian empire, by drawing up in battle array against their records legions of romantic writers, who were not born till near a thousand years after the events had taken place; and to complete the probability, who lived 200 years after all the chronicles of the Medes and Persians had been finally destroyed by the fury of the Saracens.

After the decisive victory obtained over the Persians at Ka'esse, their ancient government was overturned, their religion proscribed, their laws trampled under foot, and their civil transactions disturbed by the forcible introduction of the lunar for the solar calendar; while, at the same time, their language became almost overwhelmed by an inundation of Arabic words; which from that period, religion, authority, and fashion, incorporated with their idiom.

From the seventh till the tenth century the Persian tongue, now impregnated with Arabic words, appears to have laboured under much discouragement and neglect. Bagdad, built by Almanzor, became soon after the year 762 the chief residence of the khalifs, and the general resort of the learned and the ambitious from every quarter of the empire. At length the accession of the Buyah princes to the Persian throne marked in the tenth century the great epoch of the revival of Persian learning. About the year 977 the throne of Persia was filled by the great Azaduddawla; who first assumed the title of *Sultan*, afterwards generally adopted by eastern princes. He was born in Isfahan, and had a strong attachment to his native kingdom. His court, whether at Bagdad or in the capital of Persia, was the standard of taste and the favourite residence of genius. The native dialect of the prince was particularly distinguished, and became soon the general language of composition in almost every branch of polite learning. From the end of the tenth till the fifteenth century may be considered as the most flourishing period of Persian literature. The epic poet Firdausi, in his romantic history of the Persian kings and heroes, displays an imagination and smoothness of numbers hardly inferior to Homer. The whole fanciful range of Persian enchantment he has interwoven in his poems, which abound with the noblest efforts of genius. This bard has stamped a dignity on the monsters and fictions of the east, equal to that which the prince of epic poetry has given to the mythology of ancient Greece. His language may at the same time be considered as the most refined dialect of the ancient Persian, the Arabic being introduced with a very sparing hand: whilst Sadi, Jami, Hafez, and other succeeding writers, in prose as well as verse, have blended in their works the Arabic without reserve; gaining perhaps in the nervous luxuriance of the one language

what may seem to have been lost in the softer delicacy of the other. Hence Ebn Fekreddin Anju, in the preface to the dictionary called *Farhang Jilanguini*, says, that the Deri and the Arabic idioms were the languages of heaven; God communicating to the angels his milder mandates in the delicate accents of the first, whilst his stern commands were delivered in the rapid accents of the last.

For near 300 years the literary fire of the Persians seems indeed to have been almost extinguished; since, during that time, hardly any thing of that people which deserves attention has appeared in Europe: enough, however, has already been produced, to inspire us with a very high opinion of the genius of the east. In taste, the orientals are undoubtedly inferior to the best writers of modern Europe; but in invention and sublimity, they are excellent, perhaps equalled, by none. The Persians affect a rhetorical luxuriance, which to a European wears the air of unnecessary redundancy. If to these leading distinctions we add a peculiar tone of imagery, or metaphor, of allusion, derived from the difference of government, of manners, of temperament, and of such natural objects as characterise Asia from Europe; we shall see, at one view, the great points of variation between the writers of the east and west. Amongst the oriental historians, philosophers, rhetoricians, and poets, many will be found who would do honour to any age or people; whilst their romances, their tales, and their fables, stand upon a ground which Europeans have not yet found powers to reach. We might here quote the Arabian Nights Entertainments, Persian Tales, Pilpay's Fables, &c.

We shall now annex a few strictures on the genius of that noble language; though it is our opinion that the province of the philologist is to investigate the origin, progress, and final improvement of a language, without descending to its grammatical minutiae or peculiar idiomatic distinctions. We have already observed, that the tongue under consideration is partly Arabic and partly Persian, though the latter generally has the ascendant. The former is nervous, impetuous, and masculine; the latter is flowing, soft, and luxuriant. Wherever the Arabic letters do not readily incorporate with the Persian, they are either changed into others or thrown away. Their letters are the Arabic with little variation; these being found more commodious and expeditious than the old letters of the Deri and Partii. Their alphabet consists of 32 letters, which, like the Arabic, are read from right to left; their form and order will be learned from any grammar of that language. The letters are divided into vowels and consonants as usual. The Arabic characters, like those of the Europeans, are written in a variety of different hands; but the Persians write their poetical works in the Taliq, which answers to the most elegant of our Italian hands.

There is a great resemblance between the Persian and English languages in the facility and simplicity of their form and construction: the former, as well as the latter, has no difference of terminations to mark the gender either in substantives or adjectives; all inanimate things are neuter; and animals of different sexes have either different names, or are distinguished by the words *new* male, and *made* female. Sometimes in-

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The genius
of the mo-
dern Persi-

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the most
flourishing
period of
Persian li-
terature.

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Reform-
ance has
been Per-
sian and
English.

deed a word is made feminine, after the manner of the Arabians, by having *ah* added to it.

The Persian substantives have but one variation of case, which is formed by adding a syllable to the nominative in both numbers; and answers often to the dative, but peculiarly to the accusative, case in other languages. The other cases are expressed for the most part by particles placed before the nominative. The Persians have two numbers, singular and plural; the latter is formed by adding a syllable to the former.

The Persian adjectives admit of no variation but in the degree of comparison. The comparative is formed by adding *tar*, and the superlative by adding *terin* to the positive.

The Persians have active and neuter verbs like other nations; but many of their verbs have both an active and neuter sense, which can be determined only by the construction. These verbs have properly but one conjugation, and but three changes of tense: the imperative, the aorist, and the preterite; all the other tenses being formed by the help of particles or of auxiliary verbs. The passive voice is formed by adding the suffixes of the substantive verb to the participle of the active.

In the ancient language of Persia there were very few or no irregularities; the imperative, which is often irregular in the modern Persian, was anciently formed from the infinitive, by rejecting the termination *eden*; for originally all infinitives ended in *den*, till the Arabs introduced their harsh consonants before that syllable, which obliged the Persians, who always affected a sweetness of pronunciation, to change the old termination of some verbs into *am*, and by degrees the original infinitive grew quite obsolete; yet they still retain the ancient imperative, and the aorists which are formed from it. This little irregularity is the only anomalous part of the Persian language; which nevertheless far surpasses in simplicity all other languages ancient or modern.

With respect to the more minute and intricate parts of this language, as well as its derivations, compositions, constructions, &c. we must remit our readers to Minnase's *Institutiones Lingue Turcice cum rudimentis persicis lingua Arab. et Pers.* Sir William Jones's Persian Grammar; Mr Richardson's Arabian and Persian Dictionary; D. Herbelot's *Bibl. Orient.* Dr Hyde de Relig. vet. Pers. &c. Our readers, who would penetrate into the innermost recesses of the Persian history, colonies, antiquities, connections, dialects, may consult the last mentioned author, especially chap. xxxv. *De Persia et Persarum nominibus, et de moderna atque veteri lingua Persica, ejusque dialectis.* In the preceding inquiry we have followed other authors, whose accounts appeared to us more natural, and much less embarrassing.

To conclude this section, which might easily have been extended into a large volume, we shall only take the liberty to put our readers in mind of the vast utility of the Arabian and Persian languages. Numberless events are preserved in the writings of the orientals which were never heard of in Europe, and must have for ever lain concealed from the knowledge of its inhabitants, had not these two tongues been studied and understood by the natives of this quarter of the globe. Many of those events have been transmit-

ted to posterity in poems and legendary tales like the Runic fragments of the north, the romances of Spain, or the Heroic ballads of our own country. Such materials as these, we imagine, may have suggested to Firdausi, the celebrated heroic poet of Persia, many of the adventures of his *Shahname*; which, like Homer when stripped of the machinery of supernatural beings, is supposed to contain much true history, and a most undoubted picture of the superstition and manners of the times. The knowledge of these two languages has laid open to Europe all the treasures of oriental learning, and has enriched the minds of Britons with Indian science as much as the produce of these regions has increased their wealth and enervated their constitution.

Before we conclude this section, we shall join a few strictures on the nature of Persian poetry, in order to render our inquiry the more complete. The modern Persians borrowed their poetical measures from the Arabs: they are exceedingly various and complicated; they consist of 19 different kinds; but the most common of them are the *Iambic* or *Trochaic* measure, and a metre that chiefly consists of those compounded feet which the ancients called *heptameters*, which are composed of iambic and spondees alternately. In lyric poetry their verses generally consist of 12 or 16 syllables; they sometimes, but seldom, consist of 14. Some of their lyric verses contain 13 syllables; but the most common Persian verse is made up of 11; and in this measure are written all their great poems, whether upon heroic or moral subjects, as the works of Firdausi and Jami, the Bostar of Sadi, and the Mesnavi of Gelaleddin. This sort of verse answers to our common heroic rhyme, which was brought to so high a degree of perfection by Pope. The study of the Persian poetry is so much the more necessary, as there are few books or even letters written in that language, which are not interspersed with fragments of poetry. As to their prosody, nothing can be more easy and simple. When the student can read prose easily, he will with a little attention read poetry with equal facility.

SECT. V. *Shanscrit and Bengalese Languages.*

THE Shanscrit, though one of the most ancient languages in the world, was little known even in Asia till about the middle of the present century. Since that period, by the indefatigable industry of the very learned and ingenious Sir William Jones and the other worthy members of that society of which he has the honour to be president, that noble and ancient language has at length been brought to light; and from it vast treasures of oriental knowledge will be communicated both to Europe and Asia; knowledge which, without the exertions of that happy establishment, must have lain concealed from the researches of mankind to the end of the world. In this section we propose to give to our readers such an account of that language as the limits of the present article, and the helps we have been able to procure, shall permit.

The Shanscrit language has for many centuries lain concealed in the hands of the bramins of Hindostan. It is by them deemed sacred, and is of consequence confined solely to the offices of religion. Its name imports

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imports the *perfect language*, or, according to the eastern style, *the language of perfection*; and we believe no language ever spoken by man is more justly intitled to that high epithet.

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Traces of
Shanferit in
every dis-
trict of
Asia and
elsewhere.

The grand source of Indian literature, and the parent of almost every dialect from the Persian gulph to the China seas, is the Shanferit; a language of the most venerable and most remote antiquity, which, tho' at present shut up in the libraries of the bramins, and appropriated solely to the records of their religion, appears to have been current over most of the oriental world. Accordingly traces of its original extent may be discovered in almost every district of Asia. Those who are acquainted with that language have often found the similitude of Shanferit words to those of Persian and Arabic, and even of Latin and Greek; and that not in technical and metaphorical terms, which refined arts and improved manners might have occasionally introduced, but in the main ground-work of language, in monosyllables, the names of numbers, and appellations of such things as would be first discriminated on the immediate dawn of civilization.

The ancient coins of many different and distant kingdoms of Asia are stamped with Shanferit characters, and mostly contain allusions to the old Shanferit mythology. Besides, in the names of persons and places, of titles and dignities, which are open to general notice, even to the farthest limits of Asia, may be found manifest traces of the Shanferit. The scanty remains of Coptic antiquities afford little scope for comparison between that idiom and this primitive tongue; but there still exists sufficient ground to conjecture, that, at a very early period, a correspondence did subsist between these two nations. The Hindoos pretend, that the Egyptians frequented their country as disciples, not as instructors; that they came to seek that liberal education and those sciences in Hindostan, which none of their own countrymen had sufficient knowledge to impart. Perhaps we may examine the validity of this claim hereafter.

94
Number of
books in
that lan-
guage.

But though numberless changes and revolutions have from time to time convulsed Hindostan, that part of it which lies between the Indus and the Ganges still preserves that language whole and inviolate. Here they still offer a thousand books to the perusal of the curious; many of which have been religiously handed down from the earliest periods of human existence.

95
Characte-
ristics of it.

The fundamental part of the Shanferit language is divided into three classes: *Dhaat*, or roots of verbs, which some call primitive elements; *Shabd*, or original nouns; and *Evyā*, or particles. The latter are ever indeclinable, as in other languages; but the words comprehended in the two former classes must be prepared by certain additions and inflexions to fit them for a place in composition. And here it is that the art of the grammarian has found room to expand itself, and to employ all the powers of refinement. Not a syllable, not a letter, can be added or altered but by regimen; not the most trifling variation of the sense, in the minutest subdivision of declension or conjugation, can be effected without the application of several rules: all the different forms for every change of gender, number, case, person, tense, mood, or degree, are methodically arranged for the assistance of the me-

memory, according to an unerring scale. The number of the radical or elementary parts is about 700; and to these, as to the verbs of other languages, a very plentiful stock of verbal nouns owes its origin; but these are not thought to exceed those of the Greek either in quantity or variety.

To the triple source of words mentioned above, every term of truly Indian original may be traced by a laborious and critical analysis. All such terms as are thoroughly proved to bear no relation to any one of the Shanferit roots, are considered as the production of some remote and foreign idiom, subsequently ingrafted upon the main stock; and it is conjectured, that a judicious investigation of this principle would throw a new light upon the first invention of many arts and sciences, and open a fresh mine of philological discoveries. We shall now proceed to give an exact account of the constituent parts of this language as the nature of our design will permit.

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The Shanferit language is very copious and nervous. The first of these qualities arises in a great measure from the vast number of compound words with which it is almost overstocked. "The Shanferit (says Sir William Jones), like the Greek, Persian, and German, delights in compounds; but to a much higher degree, and indeed to such excess, that I could produce words of more than 20 syllables; not formed ludicrously like that by which the buffoon in Aristophanes describes a feast, but with perfect seriousness, on the most solemn occasions, and in the most elegant works." But the style of its best authors is wonderfully concise. In the regularity of its etymology it far exceeds the Greek and Arabic; and, like them, has a prodigious number of derivatives from each primary root. The grammatical rules also are numerous and difficult, though there are not many anomalies. As one instance of the truth of this assertion, it may be observed, that there are seven declensions of nouns, all used in the singular, the dual, and the plural numbers, and all of them differently formed, according as they terminate with a consonant, with a long or a short vowel; and again, different also as they are of different genders: not a nominative case can be formed to any one of these nouns without the application of at least four rules, which vary likewise with each particular difference of the nouns, as above stated; add to this, that every word in the language may be used through all the seven declensions, which is a full proof of the difficulty of the idiom.

The Shanferit grammars are called *Brāhṁarūn*, of which there are many composed by different authors; some too abstruse even for the comprehension of most bramins, and others too prolix to be ever used but as references. One of the shortest, named the *Sārāśotee*, contains between two and three hundred pages, and was compiled by Anobhōtēē Seroopēnām Achārigē, with a conciseness that can scarcely be paralleled in any other language.

The Shanferit alphabet contains 50 letters; and it is one boast of the bramins, that it exceeds all other alphabets in this respect; but it must be observed, that as of their 34 consonants, near half carry combined sounds, and that six of their vowels are merely the correspondent long ones to as many which are short, the advan-

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lese Lan-
guages.

*Plate
CCXC

99
Origin of
this tongue.

tage seems to be little more than fanciful. Besides these, they have a number of characters which Mr Halhed calls connected vowels, but which have not been explained by the learned president of the Asiatic Society.

The Shanferit character used in Upper Hindostan * is said to be the same original letter that was first delivered to the people by Brahma, and is now called *Dicwanagur*, or the language of angels, which shows the high opinion that the bramins have entertained of that character. Their consonants and vowels are wonderfully, perhaps whimsically, modified and diversified; to enumerate which, in this place, would contribute very little either to the entertainment or instruction of our readers. All these distinctions are marked in the *Ivicki* (1), and must be modulated accordingly; so that they produce all the effect of a laboured recitative; but by an attention to the music of the chant, the sense of the passage recited equally escapes the reader and the audience. It is remarkable, that the Jews in their synagogues chant the Pentateuch in the same kind of melody; and it is supposed that this usage has descended to them from the remotest ages.

98
Poetry.

The Shanferit poetry comprehends a very great variety of different metres, of which the most common are these:

The *munnee burreneb chbund*, or line of 12 or 19 syllables, which is scanned by three syllables in a foot, and the most approved foot is the anapest.

The *cäbee chbund*, or line of 11 syllables.

The *anühtose chbund*, or line of eight syllables.

The poems are generally composed in stanzas of four lines, called *ashloques*, which are regular or irregular.

The most common *ashlogue* is that of the *anühtose chbund*, or regular stanza of eight syllables in each line. In this measure the greatest part of the *Mähābhārat* is composed. The rhyme in this kind of stanza should be alternate; but the poets do not seem to be very nice in the observance of a strict correspondence in the sounds of the terminating syllables, provided the feet of the verse are accurately kept.

This short *anühtose ashlogue* is generally written by two verses in one line, with a pause between; so the whole then assumes the form of a long distich.

The irregular stanza is constantly called *anyächbund*, of whatever kind of irregularity it may happen to consist. It is most commonly compounded of the long line *cäbee chbund* and the short *anühtose chbund* alternately; in which form it bears some resemblance to the most common lyric measure of the English.

To pursue this subject to greater length is scarce possible for us, as matters stand at present. Our readers must suspend their curiosity till more volumes of the *Asiatic Researches* are published, where we make no doubt the whole mystery of this extraordinary language will be plainly unfolded.

Perhaps our readers may feel a curiosity to be informed of the origin of this oriental tongue. If we believe the bramins themselves, it was coeval with the race of man, as was observed towards the beginning of

this section. The bramins, however, are not the only people who ascribe a kind of eternity to their own particular dialect. We find that the Shanferit in its primitive destination was appropriated to the offices of religion. It is indeed pretended, that all the other dialects spoken in Hindostan were emanations from that fountain, to which they might be traced back by a skilful etymologist. This, we think, is an argument of no great consequence, since we believe that all the languages of Europe, by the same process, may be deduced from any one of those current in that quarter of the globe. By a parity of reason, all the different dialects of Hindostan may be referred to the language in question. Indeed, if we admit the authority of the Mosaic history, all languages whatsoever are derived from that of the first man. It is allowed that the language under consideration is impregnated with Persian, Chaldaic, Phœnician, Greek, and even Latin idioms. This, we think, affords a presumption that the Shanferit was one of those original dialects which were gradually produced among the descendants of Noah, in proportion as they gradually receded from the centre of population. What branch or branches of that family emigrated to Hindostan, it is not easy to determine. That they were a party of the descendants of Shem is most probable, because the other septa of his posterity settled in that neighbourhood. The sum then is, that the Hinloos were a colony consisting of the descendants of the patriarch Shem.

It appears, however, by almost numberless monuments of antiquity still existing, that at a very early period a different race of men had obtained settlements in that country. It is now generally admitted, that colonies of Egyptians had peopled a considerable part of Hindostan. Numberless traces of their religion occur everywhere in those regions. The very learned president himself is positive, that vestiges of those sacerdotal wanderers are found in India, China, Japan, Tibet, and many parts of Tartary. Those colonists, it is well known, were zealous in propagating their religious ceremonies wherever they resided, and wherever they travelled. There is at the same time even at this day a striking resemblance between the sacred rites of the vulgar Hindoos and those of the ancient Egyptians. The prodigious statues of Salfette and Elephanta fabricated in the Egyptian style; the vast excavations hewn out of the rock in the former; the woolly hair of the statues, their distorted attitudes, their grotesque appearances, their triple heads, and various other configurations—plainly indicate a foreign original. These phenomena suit no other people on earth so exactly as the sons of Mizraim. The Egyptian priests used a sacred character, which none knew but themselves; none were allowed to learn except their children and the choice of the initiated. All these features mark an exact parallel with the bramins of the Hindoos. Add to this, that the dress, diet, lustrations, and other rites of both sects, bore an exact resemblance to each other. Sir William Jones hath justly observed, that the letters of the Shanferit, stripped of all adventitious appendages, are really the square Chaldaic cha-

(1) The books which contain the religion of the bramins.

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guages.

* 1 lb. iii.
q. i. 2. et
54.

characters. We learn from Cassiodorus * the following particulars: "The height of the obelisks is equal to that of the circus; now the higher is dedicated to the sun, and the lower to the moon, where the sacred rites of the ancients are intimated by Chaldaic signatures by way of letters." Here then it is plain that the sacred letters of the Egyptians were Chaldaic, and it is allowed that those of the bramins were of the same complexion; which affords a new presumption of the identity of the Shanferit with those just mentioned.

That the Egyptians had at a very early period penetrated into Hindostan, is universally admitted. Osiris, their celebrated monarch and deity, according to their mythology, conducted an army into that country; taught the natives agriculture, laws, religion, and the culture of the vine, &c. He is said at the same time to have left colonies of priests, as a kind of missionaries, to instruct the people in the ceremonies of religion. Sesostris, another Egyptian potentate, likewise over-ran Hindostan with an army, and taught the natives many useful arts and sciences. When the pastor-kings invaded and conquered Egypt, it is probable that numbers of the priests, in order to avoid the fury of the merciless invaders who demolished the temples and persecuted the ministers of religion, left their native country, and transported themselves into India. These, we should think, were the authors both of the language and religion of the bramins. This dialect, as imported by the Egyptians, was probably of the same texture with the sacred language of that people, as it appeared many ages after. The Indians, who have always been an inventive and industrious race of men, in process of time cultivated, improved, diversified, and constructed that language with such care and assiduity, that it gradually arrived at that high degree of perfection in which at present it appears.

Had the learned president of the Asiatic Society (M), when he instituted a comparison between the deities of Hindostan on the one side and of Greece and Italy on the other, examined the analogy between the gods of Hindostan and those of Egypt, we think he would have performed a piece of service still more eminent. Having first demonstrated the similarity between the divinities of India and Egypt, he might then have proceeded to investigate the resemblance of the Egyptian and Phœnician with those of Greece and Rome. By this process a chain would have been formed which would have conducted his readers to comprehend at one view the identity of the Zetan worship almost throughout the world.

We foresee that it will be objected to this hypothesis, that all the dialects of Hindostan being clearly reducible to the Shanferit, it is altogether impossible that it could have been a foreign language. To this we answer, that at the early period when this event is supposed to have taken place, the language of the posterity of the sons of Noah had not deviated considerably from the primitive standard, and consequently the language of the Egyptians and the Hindoos was nearly

the same. The Shanferit was gradually improved: the language of the vulgar, as is always the case, became more and more different from the original archetype; but still retained such a near resemblance to the mother-tongue as proved the verity of its extraction.

To the preceding account of the Shanferit language we shall annex a few strictures on the language of Bengali, which we believe is derived from the other, and is in most common use in the southern parts of Hindostan.

Though most of the ancient oriental tongues are read from right to left, like the Hebrew, Chaldaic, Arabic, &c. yet such as properly belong to the whole continent of India proceed from left to right like those of Europe. The Arabic, Persian, &c. are the grand sources whence the former method has been derived; but with these, the numerous original dialects of Hindostan have not the smallest connection or resemblance.

The great number of letters, the complex mode of combination, and the difficulty of pronunciation, are considerable impediments to the study of the Bengali language; and the carelessness and ignorance of the people, and the inaccuracy of their characters, aggravate these inconveniences. Many of their characters are spurious; and these, by long use and the hurry of business, are now almost naturalized into the language.

The Bengal alphabet, like that of the Shanferit, from which it is derived, consists of 32 letters, whose form, order, and sound, may be learned from Mr Hallid's grammar of the Bengal language. The vowels are divided into long and short, the latter of which are often omitted in writing. Most of the oriental languages are constructed upon the same principle, with respect to the omission of the short vowel. The Hebrews had no sign to express it before the invention of the Masoretic points; in Arabic it is rarely inserted unless upon very solemn occasions, as in the Koran; in the modern Persian it is universally omitted: so to all the consonants in the Shanferit, the short vowel is an invariable appendage, and is never signified by any diacritical mark; but where the construction requires that the vowel should be dropped, a particular stroke is set under the letter. It is in vain to pretend, in a sketch like this, to detail the sound and pronunciation of these letters: this must be acquired by the ear and by practice.

In the Bengal language there are three genders, as in Greek, Arabic, &c. The authors of this threefold division of genders, with respect to their precedence, appear to have considered the neuter as a kind of residuum resulting from the two others, and as less worthy or less comprehensive than either (see Section of the Greek). The terminations usually applied upon this occasion are *ai* for the masculine, and *ee* for the feminine. In Shanferit, as in Greek and Latin, the names of all things inanimate have different genders, founded on vague and incomprehensible distinctions: the same is the case with the Bengal.

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Peculiar-
ties of
Shanferit
and Benga-
lese nouns.

A Shanferit noun, on its first formation from the general root, exists equally independent of case as of gender. It is neither nominative, nor genitive, nor accusative; nor is it impressed with any of those modifications which mark the relation and connection between the several members of a sentence. In this state it is called an *imperfect* or *crude* noun. To make a nominative of a word, the termination must be changed and a new form supplied. Thus we see, that in the Shanferit, at least, the nominative has an equal right with any other inflexion to be called a case. Every Shanferit noun has seven cases, exclusive of the vocative; and therefore comprehends two more than even those of the Latin. Mr Halted above mentioned details all the varieties of these with great accuracy, to whose Grammar we must refer our readers. The Bengal has only four cases beside the vocative; in which respect it is much inferior to the other.

It would be difficult to account for the variety of words which have been allotted to the class of pronouns by European grammarians. The first and second person are chiefly worthy of observation: these two should seem to be confined to rational and conversable beings only: the third supplies the place of every object in nature; wherefore it must necessarily be endued with a capacity of shifting its gender respectively as it shifts the subject; and hence it is in Shanferit frequently denominated an adjective. One of the demonstratives *hic* or *ille* usually serves for this purpose; and generally the latter, which in Arabic has no other name than *dhemer el ghaayb*, "the pronoun of the absentee," for whose name it is a substitute.

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Bengalese
pronouns.

In most languages where the verb has a separate inflection for each person, that inflection is sufficient to ascertain the personality; but in Bengal compositions, though the first and second persons occur very frequently, nothing is more rare than the usage of the pronoun of the third; and names of persons are inserted with a constant and disgusting repetition, to avoid, as it should seem, the application of the words *HE* and *SHE*. The second person is always ranked before the first, and the third before the second. The personal pronouns have seven cases, which are varied in a very irregular manner. Leaving these to the Bengalian grammar, we shall proceed to the *verb*.

The Shanferit, the Arabic, the Greek and Latin verbs, are furnished with a set of inflections and terminations so comprehensive and so complete, that by their form alone they can express all the different distinctions both of persons and time. Three separate qualities in them are perfectly blended and united. Thus by their root they denote a particular act, and by their inflection both point out the time when it takes place and the number of the agents. In Persian, as in English, the verb admits but of two forms, one for the present tense and one for the aorist; and it is observable, that while the past tense is provided for by a peculiar inflexion, the future is generally supplied by an additional word conveying only the idea of time, without any other influence on the act implied by the principal verb. It is also frequently necessary that the different state of the action, as perfect or imperfect, be further ascertained in each of the tenses, past, present, and future. This also, in the learned

languages, is performed by other variations of inflections, for which other verbs and other particles are applied in the modern tongues of Europe and Persia.

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guages.

Every Shanferit verb has a form equivalent to the middle voice of the Greek, used through all the tenses with a reflective sense, and the former is even the most extensive of the two in its use and office: for in Greek the reflective can only be adopted intransitively when the action of the verb descends to no extraneous subject; but in Shanferit, the verb is both reciprocal and transitive at the same time.

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Middle
voice of
Shanferit
verbs.

Neither the Shanferit, nor the Bengalese, nor the Hindostanic, have any word precisely answering to the sense of the verb *I have*, and consequently the idea is always expressed by *est mihi*; and of course there is no auxiliary form in the Bengal verb correspondent to *I have written*, but the sense is conveyed by another mode. The verb substantive, in all languages, is defective and irregular, and therefore the Shanferit calls it a *semi-verb*. It is curious to observe that the present tense of this verb, both in Greek and Latin, and also in the Persian, appears plainly to be derived from the Shanferit. In the Bengalese, this verb has but two distinctions of time, the present and the past; the terminations of the several persons of which serve as a model for those of the same tense in all other verbs respectively.

Verbs of the Bengal language may be divided into three classes, which are distinguished by their penultimate letter. The simple and most common form has an open consonant immediately preceding the final letter of the infinitive. The second is composed of those words whose final letter is preceded by another vowel or open consonant going before it. The third consists entirely of causals derived from verbs of the first and second conjugations. The reader will easily guess at the impossibility of prosecuting this subject to any greater length: we shall therefore conclude with a few remarks collected from the grammar so often mentioned, which we apprehend may be more amusing, if not more instructing.

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Character-
istics of the
Bengalese
verbs.

The Greek verbs in μ are formed exactly upon the same principle with the Shanferit conjugations, even in the minutest particulars. Instances of this are produced in many verbs, which from a root form a new verb by adding the syllable *mi*, and doubling the first consonant. This mode furnishes another presumption of the Egyptian origin of the Shanferit. Many Greeks travelled into Egypt; many Egyptian colonies settled in Greece. By one or other of those channels the foregoing innovation might have been introduced into the Greek language.

To form the past tense, the Shanferit applies a syllabic augment, as is done in the Greek: the future has for its characteristic a letter analogous to that of the same tense in the Greek, and it omits the reduplication of the first consonant. It may be added, that the reduplication of the first consonant is not constantly applied to the present tense of the Shanferit more than to those of the Greek.

The natural simplicity and elegance of many of the Asiatic languages are greatly debased and corrupted by the continual abuse of auxiliary verbs; and this inconvenience has evidently affected the Persian, the Hindostan, and the Bengal idioms.

The

Shan-
crit
and Ben-
ga-
lese Lan-
guages.

The infinitives of verbs in the Shan-
crit and Benga-
lese are always used as substantive nouns. Every
body knows that the same mode of arrangement very
often occurs in the Greek.

In the Shan-
crit language, as in the Greek, there
are forms of infinitives and of participles comprehen-
sive of time; there are also other branches of the verb
that seem to resemble the gerunds and supines of the
Latin.

All the terms which serve to qualify, to distinguish,
or to augment, either *substance* or *action*, are classed by
the Shan-
crit grammarians under one head; and the
word used to express it literally signifies *increase* or
addition. According to their arrangement, a simple
sentence consists of three members; the *agent*, the *ac-
tion*, the *subject*: which, in a grammatical sense, are
reduced to two; the *noun* and the *verb*. They have
a particular word to specify such words as amplify
the noun which imports quality, and answers to our
adjectives or *epithets*: Such as are applied to denote
relation or connection, are intimated by another term
which we may translate *preposition*.

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Shan-
crit
and Ben-
ga-
lese ad-
jectives.

The adjectives in Benga-
lese have no distinction of
gender or number; but in Shan-
crit these words pre-
serve the distinction of gender, as in the Greek and
Latin.

Prepositions are substitutes for cases, which could
not have been extended to the number necessary for
expressing all the several relations and predicaments
in which a noun may be found, without causing too
much embarrassment in the form of a declension. Those
are too few in the Greek language, which occasions
much inconvenience. See sect. *Greek*.

The Latin is less polished than the Greek, and of
consequence bears a much nearer resemblance to the
Shan-
crit, both in words, inflections, and termina-
tions.

The learned are now convinced that the use of nu-
merical figures was first derived from India. Indeed
the antiquity of their application in that country far
exceeds the powers of investigation. All the nume-
rals in Shan-
crit have different forms for the different
genders, as in Arabic. There appears a strong pro-
bability that the European method of computation
was derived from India, as it is much the same with
the Shan-
crit, though we think the Europeans learn-
ed it from the Arabians. The Benga-
lese merchants
compute the largest sums by *fours*; a custom evidently
derived from the original mode of computing by the
fingers.

The Shan-
crit language, among other advantages,
has a great variety in the mode of arrangement; and
the words are so knit and compacted together, that
every sentence appears like one complete word. When
two or more words come together in *regimine*, the last
of them only has the termination of a case; the others
are known by their position; and the whole sentence
so connected, forms but one compound word, which is
called a *foot*.

SECT. VI. Of the Chinese Language.

108
Antiquity
of the Chi-
nese.

THE Chinese, according to the most authentic ac-
counts, are a people of great antiquity. Their situa-
tion was such, as, in the earliest ages of the world,

in a great measure secured them from hostile inva-
sion. Their little commerce with the rest of man-
kind precluded them the knowledge of those improve-
ments which a mutual emulation had often generated
among other nations, who were situated in such a man-
ner, with relation to each other, as served to promote
a mutual intercourse and correspondence. As China
is a large and fertile country, producing all the neces-
saries, conveniences, and even the luxuries of life,
its inhabitants were not under the necessity of looking
abroad for the two former, nor exposed to the tempta-
tion of engaging in foreign commerce, in order to
procure the latter. Perfectly satisfied with the ar-
ticles which their own country produced, they ap-
plied themselves entirely to the practice of agriculture
and other arts connected with that profession; and
their frugality, which they retain even to this day,
taught them the lesson of being contented with little:
of consequence, though their population was almost
incredible, the produce of their soil was abundantly
sufficient to yield them a subsistence. Their inven-
tions were their own; and as they borrowed nothing
from other people, they gradually began to despise
the rest of mankind, and, like the ancient Egyptians,
branded them with the epithet of *barbarians*.

Those people had at an early period made ama-
zing proficiency in the mechanical arts. Their pro-
gress in the liberal sciences, according to the latest
and indeed the most probable accounts, was by no
means proportioned. In mathematics, geometry, and
astronomy, their knowledge was contemptible; and
in ethics, or moral philosophy, the complexion of
their laws and customs proves their skill to have been
truly superficial. They value themselves very highly
at present upon their oratorical talents; and yet of all
languages spoken by any civilized people, theirs is
confessedly the least improved. To what this untoward-
ly defect is owing, the learned have not yet been able
to determine.

The language of the Chinese is totally different
from those of all other nations, and bears very strong
signatures of an original tongue. All its words are
monosyllabic, and compositions and derivations are
altogether unknown. Their nouns and verbs admit
of no flexions: in short, every thing relating to their
idioms is peculiar, and incapable of being compared
with any other dialect spoken by any civilized people.
Most barbarous languages exhibit something that re-
sembles an attempt towards those diacritical modifica-
tions of speech; whereas the Chinese, after a space
of 4000 years, have not advanced one step beyond the
very first elements of ideal communication. This cir-
cumstance, we think, is a plain demonstration that
they did not emigrate from that region where the
primitive race of mankind is thought to have fixed
its residence. Some have imagined, we believe with
good reason, that they are a *Tartarian* race, which,
breaking off from the main body of that numerous
and widely extended people, directed their march to-
wards the south-east. There, taking in with delight-
ful and fertile plains which their posterity now inha-
bit, they found themselves accommodated so much to
their liking, that they dropped all desire of changing
their habitations. The country of China is, indeed,
so environed with mountains, deserts, and seas, that

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Their lan-
guage an
original
tongue.

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Language.Chinese
Language.

it would have been difficult for men in their primitive state to have emigrated into any of the neighbouring regions. Thus secluded from the rest of mankind, the Chinese, in all probability, were left to the strength of their own inventive powers to fabricate a language, as well as the other arts and improvements necessary for the support and convenience of life.

It is indeed obvious that their stock of vocables, when they emigrated from Tartary, was neither ample nor properly accommodated to answer the purposes of the mutual conveyance of ideas. With this slender stock, however, they seem to have been satisfied; for it does not appear that any additions were afterwards made to that which was originally imported. Instead of forming a new race of terms by compounding their primitive ones; instead of diversifying them by inflections, or multiplying them by derivatives, as is done in every other language; they rather chose to retain their primitive words, and by a variety of modifications, introduced upon their orthography or pronunciation, to accommodate them to a variety of significations. Were it possible to scrutinize all the Tartarian dialects, and to reduce them to their primitive monosyllabic character, perhaps the original language of the Chinese might be investigated and ascertained. We know that attempts have been made to compare it with some of the other Asiatic languages, especially the *Hittite*: This labour has, however, proved unsuccessful, and no primeval identity has been discovered. Before this comparison could be instituted with the most distant prospect of success, the language last mentioned must be stripped of all its adventitious qualities; and not only so, but it must be reduced to the monosyllabic tone, and then contrasted with the Chinese monosyllables; an undertaking which we are persuaded would not be readily executed. After all, we are convinced that no resemblance of any importance would be discovered.

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Process of
its fabrica-
tion.

The Chinese language must then, in our opinion, have been a Tartarian dialect, as the people themselves were colonists from Tartary. We have observed above, that those people have not hitherto found out the art of composition of words. This is the more surprising, when we consider that, in the characters which form their written language, they employ many compositions. For example, the character by which they represent *misfortune*, is composed of one hieroglyphic which represents a *house*, and another which denotes *fire*; because the greatest misfortune that can befall a man is to have his house on fire. With respect to the language which they use in speech, though they very often employ many words to express one thing, yet they never run them together into one word, making certain changes upon them that they may incorporate the more conveniently, but always preserve them entire and unaltered.

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Paucity of
its words

The whole number of words in the Chinese language does not exceed 1200: the nouns are but 326. It must certainly appear surprising, that a people whose

manners are so highly polished and refined, should be able to express so many things as mult of necessity attend such a course of life by so small a number of words, and those too monosyllables. The difficulties which attend this singular mode must be felt almost every instant; circumstances which, according to the ordinary course of things, should have induced them to attempt both an augmentation of the number of their words and an extension of those which they had by composition and derivation. We learn from Du Halde† that the Chinese have two different dialects: * *Hist. of China*, vol. ii. the one vulgar, which is spoken by the vulgar, and varies according to the different provinces; the other is called the *Mandarin language*, and is current only among the learned. The latter is properly that which was formerly spoken at court in the province of *Kiang-nan*, and gradually spread among the polite people in the other provinces. Accordingly, this language is spoken with more elegance in the provinces adjoining to *Kiang-nan* than in any other part of the kingdom. By slow degrees it was introduced into all parts of the empire, and consequently became the universal language.

It then appears that the modern language of China was originally the court dialect, and utterly unknown to the bulk of the people. From this circumstance we think it may fairly be concluded that this dialect was deemed the royal tongue, and had been fabricated on purpose to distinguish it from the vulgar dialects. We learn from Herodotus, that the *E. Ethiopians* had a royal language which was the same with the sacred idiom of the Egyptians. This Mandarin tongue was originally an artificial dialect fabricated with a view to enhance the majesty of the court, and to raise its very style and diction above that of the rest of mankind. The Chinese, a wonderfully inventive people, might actually contrive a language of that complexion, with an intention to render it obscure and enigmatical (N). Such a plan would excite their admiration, and would at the same time greatly exceed their comprehension. In process of time, when the Chinese empire was extended, the Mandarines who had been brought up at court, and understood nothing of the provincial dialects, found it convenient to have the most eminent persons in every province taught the language employed by themselves, in order to qualify them for transacting the affairs of government with them in a language which both understood. By this means the royal dialect descended to the vulgar, and in process of time became universal. The Tartar dialect formerly in use vanished; only a few vestiges of it remained; which gradually incorporating with the royal language, occasioned the variation of provincial tongues above-mentioned.

We are therefore clearly of opinion, that the modern language of the Chinese was deduced from the original Mandarine, or court dialect, and that this last was an artificial speech fabricated by the skill and ingenuity of that wonderful people. The learned have long held it up as the primary dialect, because, say they, it bears

(N) An attempt of this nature, among a people like the Chinese, is by no means improbable; nor is its success less probable. For a proof of this, we need only have recourse to Bishop Wilkins's Artificial Language, and Psalmanazar's Dictionary of the language of Formosa.

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Language.

Chinese
Language.

bears all the signatures of an original unimproved language. In our opinion, nothing appears more ingeniously artificial. It is universally allowed that, in its structure, arrangement, idioms, and phraseology, it resembles no other language. Is not every learned man now convinced that all the Asiatic languages yet known, discover unequivocal symptoms of their cognation and family resemblance? The Ethiopians, Chaldeans, Arabians, Persians, Egyptians, Hebrews, Phœnicians, the Brahmans, Bengalese, the Hindoos bordering upon China, all speak only different dialects of one language, varying from the original in dialect only, some in a greater some in a lesser degree: why should the Chinese alone stand altogether insulated and unallied?

The languages of the North all wear congenial features. The Tartar, or Tatar dialects of every clan, of every canton, of every denomination, exhibit the most palpable proofs of a near affinity: the Gothic and Slavonian dialects, which pervade a great part of Europe and some parts of Asia, are obviously brethren, and may easily be traced up to an Asiatic original. Even some of the American jargon dialects contain vocables which indicate an Asiatic or European original. Our readers, we flatter ourselves, will agree with us, that had the language of the Chinese been the original language, a resemblance must have still existed between it and its descendants. If it had originated from any other language, it would have retained some characteristic features of its parent archetype. As neither of these are to be found in the fabric of the language under consideration, the conclusion must be, that it is a language entirely different from all other tongues; that it is constructed upon different principles, descended from different parents, and framed by different artists.

The Chinese themselves have a common and immemorial tradition, that their language was framed by *Tao* their first emperor, to whom they attribute the invention of every thing curious, useful, and ornamental. Traditional history, when it is ancient, uniform, and universal, is generally well founded: upon this occasion we think the tradition above-mentioned may be fairly admitted as a collateral evidence.

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proof of
artificial
structure.

The paucity of vocables contained in this singular language, we think another presumption of its artificial texture. The Chinese *Onomathete* would find it an arduous task to devise a great number of new terms, and would therefore rest satisfied with the smallest number possible. In other languages we find the like economy was observed. Rather than fabricate new words, men chose sometimes to adapt old words to new, and, upon some occasions, even to contrary significations. To spare themselves the trouble of coining new terms, they contrived to join several old ones into one; whence arose a numerous race of compounds. Derivatives too were fabricated to answer the same purpose. By this process, instead of creating new vocables, old ones were compounded, diversified, deflected, ramified, metamorphosed, and tortured into a thousand different shapes.

The Greek is deservedly esteemed rich and copious language: its radical words have been carefully traced by several learned men, who, after the most laborious and exact scrutiny, have found that they do not amount

to more than 300. The Sanscrit language is highly compounded; its radical terms, however, are very few in number. Upon the whole, we think we may conclude, that the more any language abounds in compounds and derivatives, the smaller will be the number of its radical terms. The Arabic admits of no composition, and of consequence its words have been multiplied almost *in infinitum*; the Sanscrit, the Persian, and the Greek, abound with compounds, and we find their radicals are few in proportion.

There are, we think, three different methods which may be employed in order to enrich and extend the range of a language. 1st, By fabricating a multitude of words; the plan which has been pursued by the Arabs. 2d, By framing a multitude of compounds and derivatives; the artifice employed by the Greeks and the authors of the Sanscrit. 3d, By varying the signification of words without enlarging their number; the method practised by the Chinese and their colonists. The Arabians, we think, have shown the most fertile and inventive genius, since they have enriched their language by actually creating a new and a most numerous race of words. The fabricators of the Sanscrit and the collectors of the Greek have exhibited art, but comparatively little fertility of genius. Leaving, therefore, the Arabians, as in justice we ought, masters of the field in the contest relating to the formation of language, we may range the Greek and Sanscrit on the one side, and the Chinese on the other; and having made this arrangement, we may attempt to discover on which side the largest proportion of genius and invention seems to rest.

The Greek and Sanscrit (for we have selected them as most highly compounded) exhibit a great deal of art in modifying, arranging, and diversifying their compounds and derivatives, in such a manner as to qualify them for intimating complex ideas; but the Chinese have performed the same office by the help of a race of monosyllabic notes, simple, inflexible, invariable, and at the same time few in number. The question then comes to be, whether more art is displayed in new-modelling old words by means of declensions, conjugations, compounds, and derivatives; or by devising a plan according to which monosyllabic radical terms, absolutely invariable, should, by a particular modification of sound, answer all the purposes performed by the other. The latter appears to us much more ingeniously artificial. The former resembles a complicated machine composed of a vast number of parts, congenial indeed, but loosely connected; the latter may be compared to a simple, uniform engine, easily managed, and all its parts properly adjusted. Let us now see in what manner the people in question managed their monosyllabic notes, so as to qualify them for answering all the purposes of speech.

Though the number of words in the Chinese language does not amount to above 1200; yet that small number of vocables, by their artificial management, is sufficient to enable them to express themselves with ease and perspicuity upon every subject. Without multiplying words, the sense is varied almost *in infinitum* by the variety of the accents, inflections, tones, aspirations, and other changes of the voice and enunciation, circumstances which make those who do not

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Three different methods of enriching a language.

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That adopted by the Chinese.

thoroughly

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thoroughly understand the language frequently mistake one word for another. This will appear obvious by an example.

The word *teow* pronounced slowly, drawing out the *v* and raising the voice, signifies a *lord* or *master*. If it is pronounced with an even tone, lengthening the *v*, it signifies a *hog*. When it is pronounced quick and lightly, it imports a *kitchen*. If it be pronounced in a strong and masculine tone, growing weaker towards the end, it signifies a *column*.

By the same economy, the syllable *po*, according to the various accents, and the different modes of pronunciation, has eleven different significations. It signifies *glass*, *to boil*, *to winnow rice*, *wise or liberal*, *to prepare*, *an old woman*, *to break or cleave*, *inclined*, *a very little*, *to water*, *a slave or captive*. From these examples, and from almost numberless others which might be adduced, it is abundantly evident that this language, which at first sight appears so poor and confined, in consequence of the small number of the monosyllables of which it is composed, is notwithstanding very copious, rich, and expressive.

Again, the same word joined to various others, imports a great many different things; for example *mou*, when alone, signifies a *tree*, *wood*; but when joined with another word, it has many other significations. *Mou leao*, imports "wood prepared for building;" *mou lan*, is "bars, or wooden grates;" *mou hia*, "a box;" *mou sang*, "a chest of drawers;" *mou tsiang*, "a carpenter;" *mou eul*, "a mushroom;" *mou nu*, "a sort of small orange;" *mou sing*, "the planet Jupiter;" *mou mien*, "cotton," &c. This word may be joined to several others, and has as many different significations as it has different combinations.

Thus the Chinese, by a different arrangement of their monosyllables, can compose a regular and elegant discourse, and communicate their ideas with energy and precision; nay even with gracefulness and propriety. In these qualities they are not excelled either by the Europeans or Asiatics, who use alphabetical letters. In fine, the Chinese so naturally distinguish the tones of the same monosyllable, that they comprehend the sense of it, without making the least reflection on the various accents by which it is determined.

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Consequences of this
method on
pronunciation.

We must not, however, imagine, as some authors have related, that those people cant in speaking, and make a sort of music which is very disagreeable to the ear; these different tones are pronounced so curiously, that even strangers find it difficult to perceive their difference even in the province of *Kiang-nan*, where the accent is more perfect than in any other. The nature of it may be conceived by the guttural pronunciation in the Spanish language, and by the different tones that are used in the French and Italian: these tones are almost imperceptible; they have, however, different meanings, a circumstance which gave rise to the proverb, that *the tone is all*.

If the fineness and delicacy of their tones are such as to be scarce perceptible to a stranger, we must suppose that they do not rise high, but only by small intervals; so that the music of their language must somewhat resemble the music of the birds, which is within a small compass, but nevertheless of great variety of notes. Hence it will follow, that strangers

will find it very difficult, if not impossible, to learn this language; more especially if they have not a delicate ear and a flexible voice, and also much practice. The great difference then between the Chinese and Greek accents consists in this, that the Greeks had but two accents, the grave and acute, distinguished by a large interval, and that not very exactly marked: for the acute, though it never rises above a fifth higher than the grave, did not always rise so high, but was sometimes pitched lower according to the voice of the speaker. The Chinese must have many more accents, and the intervals between them, must be much smaller, and much more carefully marked; for otherwise it would be impossible to distinguish them. At the same time, their language must be much more musical than the Greek, and perhaps more so than any language ought to be; but this becomes necessary for the purposes above-mentioned. Du Halde is positive, that notwithstanding the perpetual variation of accents in the Chinese tongue, and the almost imperceptible intervals between these tones, their enunciation does not resemble singing: many people, however, who have resided in China, are equally positive that the tone with which they utter their words does actually resemble *canting*; and this, when we consider the almost imperceptible intervals by which they are perpetually raising and lowering the tone of their voice, appears to us highly probable.

As the people of whose language we are treating at present communicate a variety of different significations to their monosyllabic words by their different accentuation, so they employ quantity for the very same purpose. By lengthening or shortening the vowels of their words, they employ them to signify very different things. The same they perform by giving their words different aspirations, as likewise by founding them with different degrees of roughness and smoothness; and even sometimes by the different motion, posture, or attitude, with which their enunciation is accompanied. By these methods of diversifying their monosyllables (says Du Halde), they make 330 of them serve all the purposes of language, and these too not much varied in their termination; since all the words in that language either terminate with a vowel or with the consonant *n*, sometimes with the consonant *g* annexed.

From this account, we think it is evident that the Chinese, by a wonderful exertion of ingenuity, do, by different tones and prosodical modifications, by means of a very inconsiderable number of words, all invariable radicals, actually perform all that the most polished nations have been able to achieve by their compounds, derivatives, &c. diversified by declensions, conjugations, and flexions of every kind; circumstances which, in our opinion, reflect the greatest honour on their inventive powers.

With respect to the grammar of this language, as Grammar it admits of no flexions, all their words being indeclinable, their cases and tenses are all formed by particles. They have no idea of genders; and even the distinction of numbers, which in almost all other languages, even the most unimproved, is marked by a particular word, is in the Chinese only indicated by a particle. They have only the three simple tenses, namely, the past, present, and future; and for want of different

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different terminations, the same word stands either for the verb or the verbal substantive, the adjective or the substantive derived from it, according to its position in the sentence.

The Chinese language being composed of monosyllables, and these indeclinable, can scarce be reduced to grammatical rules: we shall, however, attempt to lay before our readers as much of the texture of that singular dialect as may enable them to form some vague idea of its genius and constitution. We shall begin with the letters, and proceed regularly to the remaining parts as they naturally succeed each other.

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Chinese
monosyllable
characters

The art of joining the Chinese monosyllables together is extremely difficult, and requires a very long and laborious course of study. As they have only figures by which they can express their thoughts, and have no accents in writing to vary the pronunciation, they are obliged to employ as many different figures or characters as there are different tones, which give so many different significations to the same word. Besides, some single characters signify two or three words, and sometimes even a whole period. For example, to write these words, *good morrow*, *Sir*, instead of joining the characters which signify *good* and *morrow* with that of *Sir*, a different character must be used, and this character alone expresses these three words. This circumstance greatly contributes to multiply the Chinese characters.

This method of joining the monosyllables is indeed sufficient for writing so as to be understood; but it is deemed trifling, and is used only by the vulgar. The style that is employed, in order to shine in composition, is quite different from that which is used in conversation, though the words are in reality the same. In writings of that species, a man of letters must use more elegant phrases, more lofty expressions, and the whole must be dignified with tropes and figures which are not in general use, but in a peculiar manner adapted to the nature of the subject in question. The characters of Cochin china, of Tong-king, of Japan, are the same with those of the Chinese, and signify the same things; though, in speaking, these nations do not express themselves in the same manner: of consequence the language of conversation is very different, and they are not able to understand each other; while, at the same time, they understand each other's written language, and use all their books in common.

The learned must not only be acquainted with the characters that are employed in the common affairs of life, but must also understand their various combinations, and the numerous and multi-form dispositions and arrangements which of several simple strokes make the compound characters. The number of their characters amounts to 80,000; and the man who knows the greatest number of them is of course the most learned. From this circumstance we may conclude, that many years must be employed to acquire the knowledge of such a prodigious number of characters, to distinguish them when they are compounded, and to remember their shape and import. After all, a person who understands 10,000 characters may express himself with tolerable propriety in this language, and may be able to read and understand a great number of books. The generality of their learned men do not understand above 15,000 or 20,000, and few of them doctors have at-

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tained to the knowledge of above 40,000. This prodigious number of characters is collected in their great vocabulary called *Hai-pien*. They have radical letters, which show the origin of words, and enable them to find out those which are derived from them: for instance, the characters of mountains, of trees, man, the earth, of a horse, under which must be sought all that belongs to mountains, trees, man, &c. In this search one must learn to distinguish in every word those strokes or figures which are above, beneath, on the sides, or in the body of the radical figure.

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Clemens Alexandrinus (see Section *Chaldean*, &c.) informs us, that the Egyptians employed three sorts of characters: The first was called the *epistolary*, which was used in writing letters; the second was denominated *sacred*, and peculiar to the sacerdotal order; the last *hieroglyphical*, which was appropriated to monumental inscriptions and other public memorials. This mode of representation was twofold: one, and the most simple, was performed by describing the picture of the object which they intended to represent, or at least one that resembled it pretty nearly; as when they exhibited the sun by a circle and the moon by a crescent: the other was properly symbolic; as when they marked *eternity* by a serpent with his tail in his mouth, the *air* by a man clothed in an azure robe fludded with stars, &c.

The Chinese, in all probability, had the same variety of characters. In the beginning of their monarchy, they communicated their ideas by drawing on paper the images of the objects they intended to express; that is, they drew the figure of a bird, a mountain, a tree, waving lines, to indicate birds, mountains, forests, rivers, &c.

There were, however, an infinite number of ideas to be communicated, whose objects do not fall under the cognizance of the senses; such as the soul, the thoughts, the passions, beauty, deformity, virtues, vices, the actions of men and other animals, &c. This inconvenience obliged them to alter their original mode of writing, which was too confined to answer that purpose, and to introduce characters of a more simple nature, and to invent others to express those things which are the objects of our senses.

These modern characters are, however, truly hieroglyphical, since they are composed of simple letters which retain the signification of the primitive characters. The original character for the sun was a circle, thus ☉; this they called *ga*: They now represent that luminary by the figure ☼, to which they still give the original name. But human institutions having annexed to these last framed characters the very same ideas indicated by the original ones, the consequence is, that every Chinese letter is actually significant, and that it still retains its significancy, though connected with others. Accordingly the word *t'ai*, which imports "misfortune, calamity," is composed of the letter *mien* "a house," and the letter *ho* "fire," so that the symbolical character for misfortune is the figure of a house on fire. The Chinese characters, then, are not simple letters without any signification, like those of the Europeans and other Asiatics; but when they are joined together, they are so many hieroglyphics, which form images and express thoughts.

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And truly
hieroglyphical.

Upon the whole, the original characters of the Chi-

Chinese
Language.Chinese
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nefe were real pictures (fee Section of the *Egyptian* language); the next improvement was the symbolical character; the third and laft stage is the prefent mode, in which artificial figns have been fabricated, in order to represent fuch thoughts or ideas as could not be represented by one or other of the methods above defcribed. Du Halde, Vol. II. p. 400, *et feq.* has fupplied us with rules for pronouncing the Chinefe vowels and confonants; a piece of information which, we apprehend, would be of little confequence to our readers, and which we fhall therefore pafs over, and proceed to give a brief account of their grammar. As the whole language is compofed of monofyllables, and thefe indeclinable, its grammatical ftructure muft be fimple and obvious: we fhall only mention what to us appears fingular and important.

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Speech.

In the Chinefe language there is no diverfity of genders or cafes, and of confequence no declenfions. Very often the noun is not diftinguifhed from the verb; and the fame word which in one fituation is a fubftantive, in another may become an adjective, and even a verb.

The adjective always goes before the fubftantive; but if it follows it, it becomes a fubftantive.

The cafes and numbers are known only by the compofition. The plural number is diftinguifhed by the particle *men*, which is common to all nouns; but when the noun is preceded by fome word that fignifies number, the particle *men* is not annexed.

The Chinefe genitive, both fingular and plural, when it comes after nouns, is often made by *ti*; and there is no other cafe in that language. The fame particle is fometimes placed after pronouns, as if they were derivatives.

The comparative degree is formed by adding the particle *keng*, which is always fet before the noun, and fignifies *much*. The particle *to* is fometimes ufed, which likewife imports *much*.

The Chinefe have only three perfonal pronouns, *ngo* "I," *ni* "thou," and *ta* "he;" thefe become plural by adding the fyllable *men*. They are made poffeffive by adding the fyllable *ti*, as *ngo ti* "mine," *ni ti* "thine," *ta ti* "his." The patronymics are formed by putting the name of the city, country, &c. after the pronoun: *chon* is the pronoun-relative *who*, *what*, *which*.

Chinefe verbs have only three tenses, the preterperfect, the prefent, and the future. When there is no particle added to the verb, it is the prefent: the preterperfect is made by adding the particle *leao*: to diftinguifh the future tense they ufe the particle *fiang* or *hai*; and thefe are all the varieties incident to their verbs.

The Chinefe language has no words that are properly adverbs; they only become fo by cuftom, or by the place they poffefs in difcourfe. They are often obliged to employ feveral words to exprefs the adverbs of other languages: they have none that are demonftrative, or proper for calling or exhorting; but in their ftead they are obliged to ufe nouns and verbs.

Perhaps our readers may wifh to know the Chinefe numerals; and may imagine that they bear a refemblance to thofe of the European or other Afatic dialects. In this, however, they will be difappointed.

They ftand as follows:

| | |
|------------|----------------------|
| 1 | One |
| Eut | Two |
| San | Three |
| Sace | Four |
| Ou | Five |
| Iou | Six |
| Tfi | Seven |
| Po | Eight |
| Kieou | Nine |
| Che | Ten |
| Che y | Eleven |
| Eut che | Twelve |
| San che | Thirteen |
| Pe | One hundred |
| Eut pe | Two hundred |
| T' yien | One thoufand |
| T' ouan | Ten thoufand |
| Che ouan | Twenty thoufand |
| Eut ouan | One hundred thoufand |
| Che ouan | Two hundred thoufand |
| T' pe ouan | One million. |

There are a great many particles proper to numbers in the Chinefe language: they are frequently ufed, and in a way peculiar to it; for every numeral has a particle importing the object to which it is attached. Thus *co* is ufed for man, and *y co* for a woman, &c. *hai* is ufed for illuftrious men; *tche* or *tchi* is ufed for fhips, dogs, hens; *mei* is ufed for pearls and precious things; *pen* is ufed for books; *teng* is appropriated to oxen and cows; *too* is ufed for letters and little bundles of paper; *oo* is employed for corn and pulfe. Thofe diftinctions indicate a language manufactured on purpofe to be employed by people who were too high and too haughty to converse with the vulgar.

The ftyle of the Chinefe, in their elaborate compofitions, is myfterious, concise, and allegorical, after the eastern manner. It is often obfcure to thofe who do not underftand the language thoroughly; and it requires a confiderable degree of fkill to avoid miftakes in reading an author of elegance and fublimity. Their writers exprefs a great deal in few words; and their expreffions are lively, full of fpirit, intermingled with bold comparisons and lofty metaphors. They affect to infer in their compofitions many fentences borrowed from their five canonical books; and as they compare their books to pictures, fo they liken thefe quotations to the five principal colours employed in painting; and in this their eloquence chiefly confifts.

They prefer a beautiful character to the moft finifhed picture; and nothing is more common than to fee a fingle page covered with old characters, if they happen to be fair and elegant, fold at a very high price. They honour their characters in the moft common books; and when they happen to light by chance upon a printed leaf, they gather it up with the greateft care and refpect.

In China there are three varieties of language; that of the common people, that of the people of fafhion, and that employed in writing books. Though the firft is not fo elegant as either of the other two, it is not however inferior to our European languages; though thofe who are but fuperficially acquainted with

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erals.

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the Chinese may, in fact, imagine it uncouth and barbarous. This low and rude language is pronounced and written many different ways, as is generally the case in other countries.

But a more polished, and at the same time a much more energetic, language, is employed in an almost infinite number of novels; some perhaps true, but many more the vehicles of fiction. These are replete with lively descriptions, characters highly finished, morality, variety, wit, and vivacity, in such a degree as to equal in purity and politeness the most celebrated authors of Europe. This was the language of the Mandarines; and though exquisitely beautiful in its kind, was still inferior to the language of books. This last might be styled the *hyper sublime*; and of this there are several degrees and intervals before an author can arrive at what they call the language of the *kings*. This mode of writing cannot be well understood without looking upon the letters; but when understood, it appears easy and flowing. Each thought is generally expressed in four or six characters: nothing occurs that can offend the nicest ear; and the variety of the accents with which it is pronounced produces a soft and harmonious sound.

The difference between the *king* and their other books consists in the difference of the subjects upon which they are written. Those of the former are always grand and sublime, and of course the style is noble and elevated: those of the latter approach nearer to the common affairs and events of life, and are of consequence detailed in the Mandarin tongue. In writing on sublime subjects no punctuations are used. As these compositions are intended for the learned only, the author leaves to the reader to determine where the sense is complete; and those who are well skilled in the language readily find it out.

The copiousness of the Chinese language is in a great measure owing to the multitude of its characters. It is likewise occasioned, in some degree, by the difference of their signification, as also by the artificial method of their conjunction, which is performed most commonly by uniting them two and two, frequently three and three, and sometimes four and four.

Their books are very numerous and bulky, and of course exceedingly cumbrous. A dictionary of their language was compiled in this century. It consisted of 95 large volumes. An appendix was annexed of 25 volumes. Their other books are voluminous in proportion. The Chinese, one may say, are a nation of learned men. Few people of rank neglect the belles lettres; for ignorance in a man of any degree of eminence is deemed an indelible stain on his character.

For their manner of writing, the implements with which they write, and the materials upon which they draw their characters, we must remit our readers to the article WRITING. It would, we believe, afford our readers some pleasure, could we discover and explain the reasons which have hitherto prevented the Chinese from adopting the letters employed from time immemorial by the other nations of Europe and Asia.

The Chinese have ever looked upon themselves as greatly superior to the rest of mankind. In ancient times they entertained such contemptible notions of foreigners, that they scorned to have any further com-

merce with them than to receive their homage. They were indeed, at a very early period, highly revered by the Indians, Persians, and Tartars. In consequence of this veneration, they looked upon themselves as the favourites of heaven. They imagined they were situated in the middle of the earth, in a kind of paradise, in order to give laws to the rest of mankind. Other men they looked upon with contempt and disdain, and deemed them deformed in body and defective in mind, cast out into the remote corners of the world as the dross and refuse of nature. They boasted that themselves only had received from God rational souls and beautiful bodies, in order to qualify them for being sovereigns of the species.

Such are the sentiments of the Chinese; and with such sentiments it is by no means surprising that their improvements in *language*, in *writing*, and other appendages of the belles lettres, have not been proportioned to their progress in mechanics. When people are once fully persuaded that they have already arrived at the summit of perfection, it is natural for them to sit down contented, and solace themselves with the idea of their own superior attainments. The Chinese had early entertained an exalted opinion of their own superiority to the rest of mankind; and therefore imagined that they had already carried their inventions to the *ne plus ultra* of perfection; the consequence was, that they could make no exertions to carry them higher.

The Chinese, for the space of 3000 years, had almost no intercourse with the rest of mankind. This was the consequence of their insulated situation.— They, of course, compared themselves with themselves; and finding that they excelled all their barbarian neighbours, they readily entertained an opinion that they excelled all the rest of mankind in an equal proportion. This conceit at once stifled the emotions of ambition, and deprived them of all opportunities of learning what was going forward in other parts of the world.

They despised every other nation. People are little disposed to imitate those whom they despise; and this perhaps may be one reason why they are at this day so averse from adopting the European inventions.

A superstitious attachment to the customs of the ancients, is the general character of the Asiatic nations. This is evidently a kind of diacritical feature among the Chinese. The institutions of *Fohi* are looked up to among them with equal veneration as those of *Thoth* were among the Egyptians. Among the latter, there was a law which made it capital to introduce any innovation into the music, painting, or statutory art, instituted by that legislator. We hear of no such law among the former; but custom established, and that invariably, for a space of 3000 years, might operate as forcibly among them as a positive law did among the people first mentioned. An attachment to ancient customs is often more powerful and more coercive than any law that can be promulgated and enforced by mere human authority. These reasons, we think, may be assigned as the impediments to the progress of the Chinese in the belles lettres, and perhaps in the cultivation of the other sciences.

Though the language of the Chinese is confessedly different from all the other known languages in its

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to their improvement in science and letters.

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Their books numerous and bulky.

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the lan-
guages.

character and construction, it contains, however, a great number of words evidently of the same origin with those which occur in other dialects, used by people who, according to the natural course of things, could never have been connected with that remote country. A few of those we shall produce before we conclude this section. We shall begin with the import of the name *China*.

China, or, as the orientals write it, *Sim*, is perhaps the Latin *sinus*, "the bosom, the heart, the middle." The Chinese actually imagine that their country is situated in the very middle of the earth, and of consequence call it *Cham*, "the middle, the heart;" a denomination which exactly suits their opinion.

Tu, in Chinese, intimates every thing that falls under the cognizance of the senses, every thing that strikes the sight; in Latin, *tueor*.

Ta, a table, a plank, a figure that renders every thing sensible: 2. To see, to look upon, to appear; Greek *τα* *ταρα*, whence *ταρα*, *tendo*.

Tue, to examine attentively, to inspect carefully.

Tui, the most apparent, chief, principal, first; 2. Lightning, thunder.

Tou, a sign by which to know one, letter of acknowledgment. All these ideas are contained in the Hebrew *ו*, *thu*, *signum*, which we believe has produced the Egyptian *theuth*, the god or godlike man who invented letters, geometry, music, astronomy, &c.

Tai, a dye, a theatre; Greek of old *τα*, then *ταραμαι*, "to see, to look."

Tam, Latin *tantum*, "so much."

Tan, land, country, region, a syllable annexed to the end of a great number of words. *Aqui tan*, *Aquitania*, "a land of water;" *Mauri tan*, *Mauritania*, "the land of the Moors." The orientals prefix *s*, whence *Farfi stan*, *Farfislan*, "the land or country of the Persians;" *Chusi stan*, *Chusistan*, "the country of Chuz;" *Turque stan*, *Turquestan*, "the land of the Turks."

Ti, a chief, an emperor, a title of dignity; whence the Greek *τις* "to honour;" hence, too, the word *di*, "bright, glorious;" whence *Δις* "Jupiter," *Δις* "divine;" the Latin *Dius*, now *Deus*, "God", and *Divus*, with the digamma *Æolicum* inserted; the Celtic *Dhia*, &c. It signified originally "bright, glorious," and was an epithet of the Sun.

Tum, Latin *tumeo*, "to swell."

Liven, "to love;" Hebrew *לב*, *leb*, "the heart;" Latin, *libet*. This word pervades all the dialects of the Gothic tongue, still retaining either the same or a nearly analogous signification.

Li, "letters;" Latin, *lino*, "to daub," as the Chinese actually do in forming their letters.

Lo, "to contain, that which contains;" Celtic, *log*; French, *loge*, *logis*, *loger*.

Lim, "a rule;" hence Latin, *linea*, "a line."

Su, "with;" Greek, *συ*, "with;" Celtic, *cyn*, *cym*; whence Latin, *cum*, *con*, &c.

Xim, "very high, elevated, sacred, perfect;" Latin, *eximius*.

Sin, "the heart;" Persian, *Sin*, "the heart."

Sien, "chief, first;" Celtic, *can*, *cean*, *fan*, "the head;" metaphorically, the chief, the first, the principal; Thibet, "sen, or ken," "great, elevated;" Arabic, *fame*, "to be elevated or raised."

Sim, or *Sing*, "a constellation, a star, an element;" Greek, *σημα*; Hebrew, *שמ*; Greek, *σημα*, *σημα*; Latin, *signum*.

Sis, "a man of learning;" Goth. Sax. Engl. "see; to see, fecer."

Cem, "a priest;" Hebr. *cohen*; Syr. *con*; Egypt. *can*, *cun*.

Qun, "a king;" Celtic, *ken*, *kend*, "head, chief;" Gothic, *kunaz*; Germ. Flem. Eng. *king*, also *queen*.

Hu, "a door;" Goth. Germ. Engl. *bus*, *hausen*, *boufe*.

Min, "a river;" Welch, *men*, "the water of a river;" Latin, *mano*, "to flow," and perhaps *amoenus*, "pleasant."

Hen, "hatred;" Greek, *αισος* "cruel, horrible, odious."

Kiven, "a dog;" Greek *κυων*, *id*.

Ven, "beauty;" Latin, *Venus*, *venustas*; Iceland. Swed. *won*, "pleasant;" Scotch, *veinsome*.

Han, "the soul, breath;" Greek, *ανιμος*; Latin, *anima*, *animus*.

To these instances of the analogy between the Chinese language and those of the other people of Asia and Europe many more might be added; but the preceding, it is hoped, will serve as a specimen, which is all that can be expected from an inquiry of the nature of the present.

SECT. VII. Of the Greek Language.

BEFORE we enter upon the consideration of the essential and constituent parts of this noble language, we must beg leave to settle a few preliminaries, which, we trust, will serve to throw some light upon many points which may come under consideration in the course of the following disquisition.

The Greeks, according to the most authentic accounts, were descended of Javan or Jon, the fourth son of Japhet, the eldest son of the patriarch Noah. The Scriptures of old, and all the orientals to this day, call the Greeks *Jonim*, or *Javanam*, or *Javenoth*. We have already observed, in the beginning of the article concerning the Hebrew language, that only a few of the descendants of Ham, and the most profligate of the posterity of Shem and Japhet, were concerned in building the tower of Babel. We shall not now resume the arguments then collected in support of that position; but proceed to investigate the character of that branch of the posterity of Javan which inhabited Greece and the neighbouring regions.

At what period the colonists arrived in these parts cannot be certainly determined; nor is it of great importance in the question before us. That they carried along with them into their new settlements the language of Noah and his family, is, we think, a point that cannot be controverted. We have endeavoured to prove that the Hebrew, or at least one or other of its sister-dialects, was the primæval language of mankind. The Hebrew, then, or one of its cognate branches, was the original dialect of the Jonim or Greeks.

Be that as it may, before these people make their appearance in profane history, their language deviates very widely from this original archetype. By what means, at what period, and in what length of time

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this change was introduced, is, we believe, a matter not easy to be elucidated. That it was progressive, is abundantly certain both from the rules of analogy and reason.

The colonies, which traversed a large tract of country before they arrived at their destined settlements, must have struggled with numberless difficulties in the course of their peregrinations. The earth, during the periods which immediately succeeded the universal deluge, must have been covered with forests, intersected with swamps, lakes, rivers, and numberless other impediments. As the necessities, and a few of the conveniences of life, will always engross the first cares of mankind, the procuring of these comforts will, of necessity, exclude all concern about arts and sciences which are unconnected with these pursuits. Hence we think it probable, that most of those colonies which migrated to a very great distance from the plains of Shinar, which we believe to have been the original seat of mankind, in a great measure neglected the practice of the polite but unnecessary modes of civilization which their ancestors were acquainted with, and practised before the era of their migration. Certain it is, that those nations which continued to reside in the neighbourhood of that centre of civilization, always appear in a cultivated state; while, at the same time, the colonists who removed to a considerable distance appear to have sunk into barbarism, at a period more early than the annals of profane history can reach.— This appears to have been the situation of the primary inhabitants of Greece. Their own historians, the most partial to their own countrymen that can well be imagined, exhibit a very unpromising picture of their earliest progenitors. Diodorus Siculus, in delineating the character of the original men, we believe sketches his draught from the first inhabitants of Greece †. He represents them as absolute savages, going out in small parties to make war upon the wild beasts of the field, which (according to him) kept them in continual alarm. “Necessity obliged them to band together for their mutual security; they had not sagacity enough to distinguish between the wholesome and poisonous vegetables; nor had they skill enough to lay up and preserve the fruits of autumn for their subsistence during the winter.” The scholiast on Pindar describes the situation of the inhabitants of Peloponnesus in the following manner ‡. “Now some have affirmed that the nymphs, who officiated in performing the sacred rites, were called *Melisse*. Of these Mnaseas of Patara gives the following account. They prevailed upon men to relinquish the abominable practice of eating raw flesh torn from living animals, and persuaded them to use the fruits of trees for food.— Melissa, one of them, having discovered bee-hives, ate of the honey-combs, mingled the honey with water for drink, and taught the other nymphs to use the same beverage. She called bees *Μελισσαι* *Melisse*, from her own name, and bestowed much care on the management of them.

“These things (says he) happened in Peloponnesus; nor is the temple of Ceres honoured without

nymphs, because they first pointed out the mode of living on the fruits of the earth, and put an end to the barbarous practice of feeding on human flesh. The same ladies, too, from a sense of decency, invented garments made of the bark of trees.”

Hecateus the Milesian, treating of the Peloponnesians, asserts *, “that before the arrival of the Hellenes, a race of barbarians inhabited that region; and that almost all Greece was, in ancient times, inhabited by barbarians †. In the earliest times (says ‡ *Id. lib. 1. Pausanias*) (ο) barbarians inhabited most part of the country called *Hellas*.” The original Greeks, if we may believe an author of deep research and superior ingenuity ‡, were strangers to all the most useful inventions of life. Even the use of fire was unknown till it was found out and communicated by Prometheus, who is thought to have been one of the first civilizers of mankind. Hence Æschylus †, introduces Prometheus commemorating the benefits which he had conferred upon mankind by his inventions, in a strain that indicates the uncultivated state of the world prior to the age in which he flourished. For the entertainment of our readers, we shall translate as much of that passage as suits our present purpose.

—“Of the human race

Now hear the tale, how foolish erst they were :
I taught them thought and exercise of reason ;
If aught they saw before, they saw in vain.
Hearing, they heard not ; all was shapeless dreams
For a long space of time, at random mixt
In wild confusion : for they neither knew
Tile-cover'd houses standing in the sun,
Nor timber work ; but, like the earth-bred ant,
They lodg'd in sunless caves dug under ground :
No certain sign had they of winter cold,
Nor of the flow'ry spring, or summer store,
But blindly manag'd all ; till I them taught
What time the stars appear, what time they set,
Hard to be scan'd : then arithmetic rare,
That queen of arts, by dint of patient thought
Defery'd, I taught them ; and how vocal sounds
From letters join'd arose.”

This character, though applied to mankind in general, was in reality that of the most ancient Greeks. These forbidding features had been transmitted to the poet by tradition as those of his ancestors : he was a Greek, and of consequence imputes them to all mankind without distinction.

Phoroneus, the son and successor of Inachus §, is said to have civilized the Argives, and to have taught them the use of some new inventions. This circumstance raised his character so high among the savage aborigines of the country, that succeeding ages deemed him the first of men. Pelagus obtained the like character, because he taught the Arcadians to live upon the fruit of the fig-tree, to build sheds to shelter them from the cold, and to make garments of the skins of swine.

But what clearly demonstrates the unpolished character of the most ancient Greeks is, the extravagant

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Who were long a barbarous people.

† Lib. 1.

‡ *Python.*
Ode 4.

128
Progress of their civilization.

(ο) The Greeks borrowed this contemptuous epithet from the Egyptians. See *Herod. l. ii. cap. 152.*

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gent honours lavished by them upon the inventors of useful and ingenious arts. Most of these were advanced to divine honours, and became the objects of religious worship to succeeding generations. The family of the Titans afford a most striking instance of this species of adulation. Jupiter, Jano, Mars, Apollo, Venus, Diana, &c. were sprung of this family. By the useful inventions which these personages communicated to the uncultivated nations of Greece, they obtained such lasting and such extravagant honours, that they jostled out the fitereal divinities of the country, and possessed their high rank as long as Paganism prevailed in those regions. To these testimonies of the savagism of the original Greeks, others almost without number might be added; but those adduced in the preceding part of this inquiry will, we hope, satisfy every candid reader as to the truth of the position advanced.

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A new colony arrives in Greece called Pelasgi.

While matters were in this situation with respect to the primitive Jonim or Greeks, a new colony arrived in those parts, which in a few years considerably changed the face of affairs. The people who composed this colony were called *Pelasgi*; concerning whose origin, country, character, and adventures, much has been written, and many different opinions exhibited by the learned. It is not our province to enter into a detail of their arguments and systems; we shall only inform our readers, that the general opinion is, that they were natives either of Egypt or Phœnicia. We have seen a dissertation in manuscript upon this subject, from which we are allowed to extract the following particulars.

The author, we think, has proved by very plausible arguments, that these people could not be descendants of the Egyptians nor Phœnicians. He maintains, that the *Pelasgi* were a great and numerous tribe; that they overspread all the coast of Asia Minor from Mount Mycale to Troas; that they were masters at one time of all the Asiatic and Grecian islands; that they overran Greece and many of the neighbouring countries; and all this in less than half a century. — These facts he seems to have proved from Homer, Herodotus, Diodorus Siculus, Pausanias, and other Greek authors of approved authenticity. He shows, that they were a civilized generation; that they were well acquainted with military affairs, legislation, agriculture, navigation, architecture, letters, &c. He insists, that Phœnicia could not at any given period have furnished such a numerous body of emigrants, even supposing the whole nation had emigrated, and left their native country a desert. He believes that this event took place before the invasion of Canaan by the Israelites; that consequently the *Pelasgic* migration was not occasioned by that catastrophe. He has shown, we think by very probable arguments, that the Egyptians in the earliest ages were averse to foreign expeditions, especially by sea; because that people hated this element, and besides could be under no temptation to emigrate: add to this, they were accustomed to live on small matters, and their country was exceedingly fertile and easily cultivated. It appears (says he) from Herodotus, that the *Pelasgi* were not acquainted with the religion of the Zabina, which could not have been the case had they emigrated from either of these countries. He makes it appear, at

least to our satisfaction, that Herodotus is mistaken when he supposes that the deities of Greece were derived from Egypt. He demonstrates, that the names of the greatest part of those deities are of Phœnician extraction; and this opinion he establishes by a very plausible etymological deduction. He asserts, that had the *Pelasgi* been natives of either of the countries above-mentioned, it would be absurd to suppose them ignorant of the names and religious rites of their respective nations. He finds, that the Egyptian and Phœnician colonies, which afterwards settled in Greece, were enemies to the *Pelasgi*, and either subdued or expelled them the country, which, he imagines, could scarce have been the case had both parties sprung from the same ancestors. After settling these points, he concludes, that the people in question were the progeny of the Arabian shepherds, who, at a very early period, invaded and subdued both the Lower and Upper Egypt. After possessing that country about a century and a half, they were conquered by Amenophis king of the Upper Egypt, who drove them out of the country. Upon this the fugitives retired to Palestine, where Mancho the Egyptian historian loses sight of them, and either through malice or ignorance confounds them with the Israelites. This writer supposes that those fugitives gradually directed their course for the west and north-west coasts of Asia Minor, whence they conveyed themselves over to Greece.

Such are the arguments by which the author of the dissertation above-mentioned supports his hypothesis. It is, for aught we know, altogether new, and to us it appears by no means improbable. If our curious readers should wish to know more of this subject, they may consult Gebelin's preliminary Discourse to his Greek Dictionary, Lord Monboddo's Inquiry into the Origin and Progress of Language, vol. i. towards the end, and Mr Bryant's Analysis of Ancient Mythology, *pass.*

Be this as it may, nothing is more certain than that the *Pelasgi* were the first people who in some degree civilized the savages of ancient Greece. It is not our business at present to enumerate the many useful inventions which they communicated to the Greeks, at that time worse than barbarians. We deem it, however, absolutely necessary as an introduction to our subject, to hazard a few conjectures on the language and letters of those adventurers; a point strictly connected with the subject soon to fall under consideration.

Whether we suppose the *Pelasgi* to have been the offspring of the Phœnicians, Egyptians, or Arabian shepherds, it will make little difference as to their language; every man of learning and research is convinced that those three nations, especially at that early period, spoke a dialect of the Hebrew. The *Pelasgi*, then, must have spoken a dialect of that language when they arrived in Greece. Perhaps it might have undergone several changes, and acquired some new modifications, during so many years as had passed since they began to be a separate nation, and in the course of so many peregrinations. Some monuments of theirs still extant prove this fact beyond all contradiction. As these people incorporated with the aborigines of Greece, the remains of the original language of man-

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Language.

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Who introduce letters into that country.

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ib. i.
59.

kind, or at least so much of it as had been retained by them, gradually coalesced with that of the new settlers. From this, we think, it is obvious, that prior to the arrival of the new colonists from the East, the language now current among the two united tribes must have been a dialect of the Phœnician, Arabian, Hebrew, &c. Be that as it may, Herodotus || affirms that the Pelasgi in his time spoke a barbarous language, quite unintelligible to the modern Greeks.

The reason of this difference between the language of the Hellenes or Greeks in the age of Herodotus and that of the remains of the Pelasgi at that period, seems to be this: Prior to the time of that historian, the Greek language had, from time to time, undergone many changes, and received vast improvements; whereas, on the contrary, that of the remnant of the Pelasgi, who were now reduced to a very low state, had remained stationary, and was then just in the same predicament in which it had been perhaps a century after their arrival in the country.

As the Pelasgi, as was observed above, were a people highly civilized and well instructed in the various arts at that time known in the eastern world, they were skilled in agriculture, architecture, music, &c. (p): The presumption then is that they could not be unacquainted with alphabetical writing. This most useful art was well known in the countries from which they emigrated; and of course it is impossible to imagine that they did not export this art as well as the others above-mentioned. Diodorus Siculus imagines that § the Pelasgi knew not the use of alphabetical letters, but that they received them from Cadmus and his Phœnician followers; that those letters were afterwards called *Pelasgic*, because the Pelasgi were the first people of Greece who adopted them. This account must go to the score of national vanity, since very soon after he acknowledges * that Linus wrote the exploits of the first Bacchus and several other romantic fables in Pelasgic characters; and that Orpheus, and Pronapides the master of Homer, employed the same kind of letters. Zenobius likewise informs us † that Cadmus slew Linus for teaching characters differing from his. These letters could be none other than the Pelasgi ‡.

Pausanias, in his Attica, relates ||, that he himself saw an inscription upon the tomb of Coræbus, who lived at the time when Crotopus, who was contemporary with Deucalion, was king of the Argives. This inscription then was prior to the arrival of Cadmus; and consequently letters were known in Greece before they were introduced by this chief. It likewise appears from Herodotus himself, that the Ionians were in possession of alphabetical characters before the coming of the Phœnicians. "For (says he) * the Ionians having received letters from the Phœnicians, changing the figure and sound of some

of them, ranged them with their own, and in this manner continued to use them afterwards." If, then, the Ionians (q) ranged the Phœnician characters with their own, it is obvious that they had alphabetical characters of their own.

Besides these historical proofs of the existence of Pelasgic characters, monuments bearing inscriptions in the same letters have been discovered in several parts of Greece and Italy, which place this point beyond the reach of controversy. What characters these were may be easily determined. As the Pelasgi emigrated from Arabia, the presumption is that their letters were Phœnician. They are said by Dr Swinton to have been 13 in number, whereas the Phœnician alphabet consists of 16. The three additional letters were probably invented by the latter people after the Pelasgi had left the eastern quarters. The Phœnician letters imported by the Pelasgi were, no doubt, of a coarse and clumsy contexture, unfavourable to expedition in writing, and unpleasant to the sight. Besides, the Phœnician characters had not as yet received their names; and accordingly the Romans, who derived their letters from the Arcadian Pelasgi, † *Linus* had no names for theirs. The probability is, that prior to this era the Pelasgic letters had not been distinguished by names. They were of course no other than the original letters of the Phœnicians in their first uncouth and irregular form: and for this reason they easily gave way to the Cadmean, which were more beautiful, more regular, and better adapted to expedition. Plate IX.

Hitherto we have seen the Pelasgi and the Ionim incorporated, living under the same laws, speaking the same language, and using the same letters. But another nation, and one too of vast extent and populousness, had at an early period taken possession of a considerable part of the country afterwards distinguished by the name of *Hellas* or *Greece*. The Thracians were a great and mighty nation; inferior to none except the Indians *, says the father of Grecian history. These people, at a very early period, had extended their quarters over all the northern parts of that country. They were, in ancient times, a learned and polished nation. From them, in succeeding ages, the Greeks learned many useful and ornamental sciences. Orpheus (r) the musician, the legislator, the poet, the philosopher, and the divine, is known to have been of Thracian extraction. *Thamyris* and *Linus* were his disciples, and highly respected among the Greeks for their learning and ingenuity. That these people spoke the same language with the Greeks, is abundantly evident from the connection between them and these Thracian bards. The Thracian language, then, whatever it was, contributed in a great proportion towards forming that of the Greeks. From the remains of the Thracian dialect there appears to have been a very strong resemblance between it and the

(p) The Arcadians, who were a Pelasgic tribe, were highly celebrated for their skill in music. They introduced this art into Italy. See *Dion. Halicar. L. i.*

(q) The Athenians were originally called *Ionians*.

(r) Orpheus seems to be compounded of two oriental words, *or* "light," and *phi* "the mouth." Though some deduce it from the Arabian *arif* "a learned man."

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the Chaldean. This position we could readily support by the most plausible etymological deduction, did the limits prescribed us in this article admit such an inquiry. It appears, however, that the Thracians, Getæ, and Daci or Davi, spoke nearly the same language. The Goths, so much celebrated in the annals of the lower empire, were the descendants of the Getæ and Daci, and consequently retained the dialect of their ancestors. The reader, therefore, must not be surprised, if in tracing the materials of which the Greek language is composed, we should sometimes have recourse to the remains of the Gothic.

We have now found out three branches of the Greek language; that of the Ionian or *Aborigines*, that of the Pelasgic tribe, and that of the Thracians. These three, we imagine, were only different dialects of the very same original tongue. This assertion we could readily prove by the comparison of a great number of words taken from the two last, were this a proper place for such a discussion.

Some centuries after the arrival of the Pelasgi, Cadmus, an Egyptian (s) by birth, and a sojourner in Phœnicia, arrived in Bœotia with a multitude of followers. This colony chief and his countrymen introduced letters and several other useful improvements into the country in question. As these people were natives of Phœnicia and its environs, their alphabet was that of their native country, consisting of 16 letters. That the Phœnician alphabet was nearly the same with the Samaritan and Hebrew, has been so often and so clearly demonstrated by the learned of this and the former century, that it would be altogether superfluous to insist upon it in this short inquiry. The Phœnicians, as is generally known, wrote from right to left, and the old Grecian characters inverted, exactly resemble the other.

The names of the Cadmean characters are Syrian †, which shows the near resemblance between that language and the Phœnician. They stand thus; *alpha, beta, gamma, delta* &c. The Syrians used to add *a* to the Hebrew vocables; hence *alph* becomes *alpha*, *beth*, *beta* or *keta*, &c. In the Cadmean alphabet we find the vowel letters, which is an infallible proof that this was the practice of the Phœnicians in the age of Cadmus; and this very circumstance furnishes a presumption that the Jews did the same at the same period.

After all, it is evident that the oldest Greek letters, which are written from right to left, differ very little from those of the Pelasgi. The four double letters *z, s, x, y*, are said to have been added by Palamedes about 20 years before the war of Troy. Simonides is generally supposed to have added the letters *h, n, p*, though it appears by some ancient inscriptions that some of these letters were used before the days of Palamedes and Simonides.

In the year of our Lord 1456 seven brazen tables were discovered at Etrubium, a city of Umbria in the Apennines, of which five were written in Pelasgic or Etruscan characters and two in Latin. The first of these tables is thought to have been composed

about 168 years after the taking of Troy, or 1200 years before Christ. By comparing the inscription on these tables with the old Ionic characters, the curious have been enabled to discover the resemblance.

The old Ionic character wrote from right to left continued in general use for several centuries: It was composed of the Cadmean and Pelasgic characters, with some variations of form, position, and sound. The Athenians continued to use this character till the year of Rome 350. The old Ionic was gradually improved into the new, and this quickly became the reigning mode. After the old Ionic was laid aside the * (Bustropholon) came into custom, which goes backwards and forwards as the ox does with the plough. They carried the line forward from the left, and then back to the right. The words were all placed close together, and few small letters were used before the fourth century. If our curious readers would wish to know more of letters and alphabets, we must remit them to Chishul, Morton, Pellerus, the great Montfaucon, Gabelin, Aille, &c. For our part we are chiefly concerned at present with the Phœnician and Cadmean systems; and on these perhaps we may have dwelt too long. Having now, we hope, sufficiently proved that the Greek alphabet was derived from the Phœnician, in order to convince our curious but illiterate readers of the certainty of our position, as it were by ocular demonstration, we shall annex a scheme of both alphabets, to which we shall subjoin some strictures upon such letters of the Greek alphabet as admit any ambiguity in their nature and application.

α, alpha, had two sounds, the one broad like *a* in the English word *all*; the other slender, as *e* in *end*, *spend*, *defend*. The Hebrews certainly used it so, because they had no other letter to express that sound; the Arabs actually call the first letter of their alphabet *dis*; and they as well as the Phœnicians employ that letter to express both the sound of *A* and *E* promiscuously. The Greeks call their letter *E* slender, which seems to have been introduced to supply the place of *A* slender.

Η, eta, was originally the mark of the *spiritus asper*, and no doubt answered to the Hebrew *ח*. It is still retained in that capacity in the word *ἡρώδης* and in words with the *spiritus asper* beginning books, chapters, sections, &c. *E* originally marked both the sound of *E* slender and *E* broad; that is, it was sometimes sounded short as at present, and sometimes long, where it is now supplied by *H*. As it was found convenient to distinguish these two different quantities of sound by different letters, they adopted *H*, the former *spiritus asper*, to denote the long sound of *E*, and substituted the present *spiritus asper* in its place.

ι, iota, is the Hebrew or Phœnician *jod* or *yod*. We imagine it originally served the purpose of both *iota* and *ypilon*. It had two different sounds; the one broad and full, the other weak and slender. The latter had the sound of the modern *y*. That this was actually the case, appears in several monumental inscriptions: And upon this depends the variation of some cases

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cases of the demonstrative pronoun and of the second declension.

o, *omicron* or small o, in the original Greek had three different sounds. It sounded o short, as at present; and likewise o long, now denoted by ω or large O. It likewise marked the sound of the improper diphthong ou, sounded like the English diphthong oo. The ω was taken from the Phœnician wau or V.

τ , *ypsilon*, we have observed before, was adopted to supply a mark for the sound of I slender.

z, *zeta*, is compounded of $\alpha\epsilon$. Dion. Halic. however, informs us that this letter should be pronounced $\epsilon\delta$, according to the Doric plan.

θ , *theta*, was not known in the old Greek. It is compounded of τ and the *spiritus asper*, both which were of old written separately thus TH.

ξ , *xi*, is compounded of $\gamma\varsigma$, $\kappa\varsigma$, $\chi\varsigma$. These letters, too, were originally written separately.

ϕ , *phi*. This letter is compounded of β , π , and the *spiritus asper*; thus BH, PH.

χ , *chi*, like the foregoing, is compounded of τ , κ , and the *spiritus asper* as above.

ψ , *psi*, like some of the rest, is made up of $\beta\varsigma$, $\kappa\varsigma$, which, too, were originally written in separate characters.

These observations are thrown together purely for the use of students who may not choose to penetrate into the minutiae. We are sorry that the nature of the work will not permit us to extend our researches to greater length. The reader will find an ancient inscription on Plate CCCXC, in which the powers of the letters are exemplified as they were in the first stage of the Greek language. Every language, we believe, was originally composed of inflexible words; the variations which now distinguish nouns and verbs were the effects of progressive improvements. What might have been the state of the Greek language with respect to these variations in its original form, it is not now possible to discover. That it was rude and irregular, will not, we imagine, be controverted. One of the first attempts towards forming the variations, now denominated *declensions* and *conjugations*, would probably be made upon the *demonstrative* article and the *substantive* verb. This observation will be found to hold good in most polished languages. In the Greek tongue, this was evidently the method.

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origin of
the article.

The original Greek article was imported from the east. It was the Hebrew or Phœnician \aleph *ha*. This particle sometimes signifies *one*, and sometimes it answers to our demonstrative *the*; both in its adverbial and demonstrative capacity it imports demonstration. In the earliest stages of the two oriental languages, it was probably written apart, as *ha-melech* "the king." In process of time it came to be joined with the following word, as *Hammelech*. From this we think the Greek article was deduced. It is still retained in the Doric dialect in its pristine character. The difference between *ho* and *ha* in the eastern language is nothing. Here then we have the articles δ masculine and η feminine. Upon these several changes were superinduced, in order to render them more useful for the purposes of language. For those changes we know of no archetype.

The Greeks then having adopted the Hebrew, or Phœnician, or Chaldean article *ha*, and changed it into δ .

to *ho* for the masculine, seem to have arranged its variations in the following manner:

| Sing. | Plu. |
|-------------------------|--------------------------|
| Nom. δ | $\delta\epsilon$ |
| Gen. $\epsilon\upsilon$ | $\epsilon\upsilon$ |
| Dat. $\epsilon\iota$ | $\epsilon\iota\varsigma$ |
| Acc. $\epsilon\nu$ | $\epsilon\nu\varsigma$ |

In the earliest stages of the Greek language, δ and $\epsilon\nu$ were founded in the same manner, or nearly so, as the flexion of nouns of the first and second declensions. The accusative was at first like the nominative; for distinction's sake it was made to terminate in ν , which letter was likewise adopted to characterize the genitive plural; ς was annexed to the dative plural, to distinguish it from the dative singular. The radical word was still without inflexion.

When the article was inflected in this manner, the process stood as follows: we take $\lambda\omicron\gamma\omicron\varsigma$ for an example.

| Sing. | Plu. |
|---|--|
| Nom. δ $\lambda\omicron\gamma\omicron$ speech | $\epsilon\iota$ $\lambda\omicron\gamma\omicron$ speeches |
| Gen. $\epsilon\upsilon$ $\lambda\omicron\gamma\omicron$ of speech | $\epsilon\upsilon$ $\lambda\omicron\gamma\omicron$ of speeches |
| Dat. $\epsilon\iota$ $\lambda\omicron\gamma\omicron$ to speech | $\epsilon\iota\varsigma$ $\lambda\omicron\gamma\omicron$ to speeches |
| Acc. $\epsilon\nu$ $\lambda\omicron\gamma\omicron$ speech | $\epsilon\nu\varsigma$ $\lambda\omicron\gamma\omicron$ speeches |

In this arrangement our readers will observe, that in the time under consideration, ω was not yet introduced; and therefore $\epsilon\upsilon$, $\epsilon\iota$, or little ν was the ϵ me letter in the genitive plural as in the accusative singular; but in the latter case it was sounded long, by way of distinction.

The article *ha*, which is still retained in the Doric dialect, was varied as follows:

| Sing. | Plu. |
|-----------------------|---------------------------|
| Nom. δ | $\delta\epsilon$ |
| Gen. $\delta\epsilon$ | $\delta\epsilon$ |
| Dat. $\delta\epsilon$ | $\delta\epsilon\varsigma$ |
| Acc. $\delta\nu$ | $\delta\epsilon$ |

These variations differ a little from those of the masculine; and they were no doubt made for the sake of distinction, as is usual in such cases. We shall now give an example of the feminine as it must have stood before variations were introduced. We shall employ $\tau\iota\mu\epsilon$.

| Sing. | Plu. |
|--|--|
| Nom. δ $\tau\iota\mu\epsilon$ honour | $\epsilon\iota$ $\tau\iota\mu\epsilon$ honours |
| Gen. $\epsilon\upsilon$ $\tau\iota\mu\epsilon$ of honour | $\epsilon\upsilon$ $\tau\iota\mu\epsilon$ of honours |
| Dat. $\epsilon\iota$ $\tau\iota\mu\epsilon$ to honour | $\epsilon\iota\varsigma$ $\tau\iota\mu\epsilon$ to honours |
| Acc. $\epsilon\nu$ $\tau\iota\mu\epsilon$ honour | $\epsilon\nu\varsigma$ $\tau\iota\mu\epsilon$ honours |

Afterwards, when the Chaldean article *da* was adopted for the neuter gender, the letter τ or δ was changed into ν , and prefixed to it; and then the Greeks, who, in their declension of adjectives, always followed the neuter gender, began to prefix it to the oblique cases.

In this manner we think the Greek nouns stood originally; the only change being made upon the article. At length, instead of prefixing that word, and expressing it by itself, they found it convenient to affix a fragment of it to the noun, and so to pronounce both with more expedition. Thus $\delta\epsilon$ - $\lambda\omicron\gamma\omicron$, e. g. became $\lambda\omicron\gamma\omicron$ - ϵ , $\epsilon\nu$ $\lambda\omicron\gamma\omicron$ became $\lambda\omicron\gamma\omicron$ - ν , and of course $\epsilon\iota\varsigma$ $\lambda\omicron\gamma\omicron$ and $\lambda\omicron\gamma\omicron$ - $\nu\varsigma$ &c. The *spiritus asper*, or rough breathing, was thrown away, in order to facilitate the coalition. Nouns of the neuter gender, as was necessary, were distinguished by using ν instead of ϵ . In Oriental words the Greeks often change ϵ into ν , and $\epsilon\iota$ into $\nu\epsilon$.

In this case the Greeks seem to have copied from

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In this mode of flexion the Greeks copied from the Orientals.

an eastern archetype. In Hebrew we find an arrangement exactly similar. To supply the place of the pronouns possessive, they affix fragments of the personals: Thus, they write *ben-i* "my son," instead of *ben-ani*, and *debir-nu* "our words," instead of *debir-annu*, &c. The persons of their verbs are formed in the same manner. In this way, in our opinion, the variations of the first and second declensions were produced.

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Formation of the third declension, and of its cases.

After that a considerable number of their nouns were arranged under these two classes, there remained an almost infinite number of others which could not conveniently be brought into these arrangements; because their terminations did not readily coalesce with the articles above mentioned. These, like nouns of the neuter gender, were in a manner excluded from the society of the two other classifications. It is probable that these for a long time continued ineluctable. At last, however, an effort was made to reduce them into a class as well as the others. All these excluded nouns originally terminated with *ς*, which appears from their genitives as they stand at present. By observing this case, we are readily conducted to the termination of the pristine vocable. The genitive always ends in *ος*, which ending is formed by inserting *ο* between the radical word and *ς*. By throwing out *ο* we have the ancient nominative: Thus, *Τιτας*, genitive *Τιταος*; taking out *ο* we have *Τιτας*, the original inflexible termination. *Αντα*, genitive *Ανταος*; throw out *ο* and you have *Αντα*. *Παρας*, genitive *Παραος*; take away *ο* and there remains *Παρας*. *Ορις*, genitive *Οριος*; by throwing out *ο* we have *Ορις*. *Αρας*, genitive *Αραος*; *Αραος*, *Κρατος*, *Κρατος*, *Κρατος*; originally *Κρατα*, because originally *κ* had the sound of *κ*, as was observed above. *Ματα*, genitive *Ματαος*, *Ματαος*. *Πατα*, genitive *Παταος*, *Παταος*, the old noun. In short, the genitive is always formed by inserting *ο* immediately before *ς*, which is always the termination of the nominative; and by this rule we easily discover the noun such as it was in its original form.

The dative of this declension was closed with *ι* ascriptum; the same with that of the second, namely, *ι* subscriptum. The accusative commonly terminates with *α*; but was originally ended with *ι*. The Romans imitated the Italian dialect, and they commonly ended it with *em* or *im*. The Greeks, perhaps, in this imitated their progenitors, for *a* was their favourite vowel. The nominative plural ended in *ες* which nearly resembles the English plural, and was possibly borrowed from the Thracians. The genitive plural in all the declensions ends in *ων*; the dative ends in *ις*, the *σ* being inserted to distinguish it from the dative singular. When a strong consonant, which would not easily coalesce with *ς*, comes immediately before it, that consonant is thrown out to avoid a harsh or difficult sound. The sum then is; the cases of nouns of the first and second declensions consist of the radical word with fragments of the articles annexed, and these were the first classifications of nouns. The other nouns were left out for some time, and might be denominated *neuters*; at length they too were classified, and their variations formed as above. In this process the Greeks deviated from the oriental plan; for these people always declined their nouns by particles prefixed. Whether the Greeks

were gainers by this new process, we will not pretend positively to determine. We are, however, inclined to imagine that they lost as much in perspicuity as they gained by variety.

It is generally believed that the Greeks have no ablative; to this opinion, however, we cannot assent. It is true, that the dative, and what we would call the *ablative*, are always the same: yet we think there is no more reason to believe that the latter is wanting in Greek, than that the ablative plural is wanting in Latin, because in that language both these cases are always alike.

In the eastern languages there are only two genders, analogous to the established order of nature, where all animals are either male or female. But as the people of the East are, to this day, strongly addicted to personification, they ranged all objects of which they had occasion to speak, whether animate or inanimate, under one or other of these two classes. Hence arose what is now called the *masculine* and *feminine* genders. The orientals knew nothing of a neuter gender, because, in deed, all objects were comprehended under the foregoing classes. The Phœnician feminine was formed from the masculine, by adding *ת*, *ab*. In this the Greeks in many cases imitated them. The Greeks and Latins left a vast number of substantives, like a kind of outcasts, without reducing them to any gender; this process gave rise to the neuter gender, which imports, that such substantives were of *neither* gender. This has the appearance of a defect, or rather a blemish, in both. Sometimes, too, they make words neuter, which, according to the analogy of grammar, ought to be either masculine or feminine. And again, they range words under the masculine or feminine, which by the same rule ought to have been neuter. In short, the doctrine of generic distribution seems to have been very little regarded by the fabricators of both tongues. The beauty which arises from variety seems to have been their only object.

The use of the article in the Greek language is, we think, rather indeterminate; it is often prefixed to proper names, where there is no need of demonstration nor generic distinction. On the contrary, it is often omitted in cases where both the one and the other seem to require its assistance. In short, in some cases it seems to be a mere expletive. Though both Lord Monboddo and Mr Harris have treated of this part of speech, neither the one nor the other has ascertained its proper use. (See *Orig. and Progr. of Language*, vol. ii. p. 53. *Hermes*, page 214. *et seq.*)—We know not any objection to the early use of articles among the Greeks so plausible as the total neglect of them among the Romans. But it ought to be considered, that after the flexions were introduced, the use of the article was in a great measure neglected. Accordingly, Lord Monboddo observes that it is very seldom used as such by Homer, but commonly in place of the relative pronoun, *ὃς*, *ἡ*, *ὅ*.—Thus it would appear, that at the time when the Roman language was reduced to the Grecian standard, the article was not commonly used by the Greeks; and of course the Latins never employed it. There can be no doubt but the pronoun *who*, in the northern languages, is the same with the Greek *ὃς*, and the Hebrew *hua*. This among the northern people is always

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Farther observations on the article.

Exemplum Ionicarum & Doricarum

Literarum ex columna, quæ in viâ Appiâ reperta, postea ad horti-
Farnesianos translata est.

ODEMI. ΘΕΜΙΤΟΝ. ΜΕΤΑΚΙΝΕΣΑΙΕΚ. ΤΟ. ΤΡΙΟΨΙΟ. ΗΟ
ΕΣΤΙΝ. ΕΨΙ. ΤΟ. ΤΡΙΤΟ. ΕΝ. ΤΕΙ. ΗΟΔΟΙ. ΤΕΙ. ΑΥΡΛΑΙ. ΕΝ ΤΟΙ
ΗΕΡΟΔΟ. ΑΥΡΟΙ. ΟΛΑΡ. ΛΟΙΟΝ. ΤΟΙ. ΚΙΝΕΣΑΝΤΙ. ΜΑΡΤΥΣ
ΔΑΙΜΟΝ. ΕΝΗΟΔΙΑ. ΚΑΙ. ΗΟΙ. ΚΙΟΝΕΣ. ΔΕΜΕΤΡΟΣ
ΚΑΙ. ΚΟΡΕΣ. ΑΝΑΘΕΜΑ. ΚΑΙ. ΘΟΝΙΟΝ. ΘΕΩΝ. ΚΑΙ.

Sanskrit Alphabet

Vowels

अ आ इ ई उ ऊ ऋ ॠ ऌ ॡ ए ऐ ओ औ अं अः
à crè ā ē ē ē ē ē rū rū lū lū è è o au mī ah crè

Connected Vowels

क का कि की कु कू कु कृ कृ के कै को कौ कं कः

Consonants

क ख ग घ ङ च छ ज झ ञ ट ठ ड ढ ण न य र
kè khè gu ghū n'crūn' chī chha ja jha rīpa tā thā dē dhē na lē lē

ध न प फ व भ म य र ल व श ष स ह ळ ण
dhè ne pa pha bē bhū mē yē rē lē vē śā shā i'ch kha h' mīr' esque

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Greek
verbs, how
formed.

Y44
Greek nu-
merals.

| | | |
|-------|-------------------------|---------------------|
| Pres. | EW, E.C, CE, | EDWARD, EIDE, EIDE, |
| Cont. | G, EG, CG, | GEORGE, EIDE, EIDE, |
| Fut. | EW, EDWARD, EIDE, EIDE, | EDWARD, EIDE, EIDE, |

But it is now generally admitted that the modern present was not the original one of the verb. The second, or Attic future, appears likely to have been the most ancient present. When the latter was 'improved', or rather in the course of being improved, a new present was invented, derived in part from the former, but differing widely from it in its appearance and complexion. Upon this occasion, the old present

1.6
Propositions,

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Irregulari
used,

male

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Language.

mate that those anomalies were so deeply incorporated with the constitution of the language, that the subsequent improvers found it impossible to correct them. Indeed to prefix a preposition to a case already distinguished by the affixed termination, appears to us a superfluity at least, if not an absurdity; for certainly it would have been more natural to have said *ἐν τῇ ἀρχῇ*, than *ἐν τῇ ἀρχῇ ἀρχῇ*. Some very learned men, who have inquired into the origin of language, have been of opinion that prepositions were the last invented species of words. If this opinion is well founded, we may suppose (and we think that this supposition is not altogether improbable) that the casual terminations of the Greek language were first affixed to the radix, in the manner above exhibited; and that prepositions were afterwards fabricated and prefixed to the cases already in use.

The syntax or construction of the Greek language does not, according to our plan, come within the compass of our present inquiry. This the curious Greek student will easily acquire, by applying to the grammars composed for that purpose. We have already hazarded a few conjectures with respect to the formation of the most important and most distinguished classes of words into which it has been divided by the most able grammarians, without, however, descending to the minutæ of the language. As prepositions are the chief materials with which its other words, especially verbs, are compounded, we shall briefly consider the order in which they probably advanced in this process.

Complex ideas are compounded of a certain number or collection of simple ones. Of those complex notions, some contain a greater and some a smaller number of simple conceptions. In language, then, there are two ways of expressing those complex ideas, either by coining a word to express every simple idea separately, according to the order in which they stand in the mind; or by trying to combine two or more simple terms into one, and by that method to intimate one complex idea by one single word. The Arabians, notwithstanding all the boasted excellencies of their language, have never arrived at the art of compounding their words, in order to answer this noble purpose; and the sister dialects are but slenderly provided with this species of vocables. The Greeks, of all other nations (except perhaps those who spake the Sanscrit language), are unrivalled in the number, variety, propriety, elegance, energy, and expression of their compound terms. The Greeks, like the Arabians, in the earliest stages of their language, had only a collection of radical disjointed words, consisting of the jargons of the aboriginal Greeks, of the Pelasgi, Thracians, &c. How these words were arranged and constructed, we have no data remaining upon which we can found a critical investigation. We must therefore remain satisfied with such probable conjectures as the nature of the case, and the analogy of the language, seem to suggest.

The prepositions were originally placed before the nouns, whose relations they pointed out. For example, let us take the *ἐν τῇ ἀρχῇ τῶν ἀλλοίων*, he died along with the rest, or he died out of hand along with the others. These words were arranged thus: *ἐν τῇ ἀρχῇ τῶν ἀλλοίων*; and *ἐν τῇ ἀρχῇ τῶν ἀλλοίων*. In this manner

the parts of every compound word were placed separately, at least as much as other words which had no connection.

The first compound words of the Greek language were the radical nouns with the article, and the radical part of the substantive or auxiliary verb. The success of this experiment encouraged them to attempt the same in other words. By this noble invention they found themselves able to express, in one word, with ease and significancy, what in other languages, and formerly in their own, required a tedious ambages or circumlocution. In process of time, as their language was gradually mellowed, they increased the number of their compounds, till their language, in that respect, infinitely excelled all its parent dialects. In this process they were careful to unite such letters as not only prevented asperity and difficulty of pronunciation, but even promoted harmony and elegance. But this was the labour of posterior ages.

The Greeks were entirely ignorant of the derivation or etymology of their language: for this we need only consult Plato's *Cratylus*, Aristotle's *Rhetoric*, Demetrius Phalereus, Longinus, &c. In deluding patronymics, abstracts, possessives, gentiles, diminutives, verbals, &c. from radicals of every kind, they have shown the greatest art and dexterity. Examples of this occur almost in every page of every Greek author. But this extended no farther than their own language; every foreign language was an abomination to the Greeks. But more of this in the sequel.

The original materials of the Greek tongue were undoubtedly rough and discordant, as we have described them above. They had been collected from different quarters, were the produce of different countries, and had been imported at very distant periods. It would therefore be an entertaining, if not an instructing, speculation, if it were possible to discover by what men and by what means this wonderful fabric was founded, erected, and carried to perfection. The writers of Greece afford us no light. Foreigners were unacquainted with that originally insignificant canton. Every thing beyond Homer is buried in eternal oblivion. Orpheus is indeed reported to have composed poems; but these were soon obliterated by the hand of time. The verses now ascribed to that philosophical hero are none of his*. Linus wrote, in the Pelasgic dialect, the achievements of the first Bacchus; *Tamiris* the Thracian wrote; and *Pronapides* the master of Homer was a celebrated poet. The works of all these bards did not long survive; and it is a certain fact that the Greek tongue was highly polished even more early than the age in which these worthies flourished. Homer, no doubt, imitated their productions, and some are of opinion that he borrowed liberally from them. The Greeks knew no more of the original character and complexion of their progenitors. They allowed, indeed, that their language was originally barbarous and uncouth; but by what means or by what persons it was polished, enriched, and finally arranged, was to them an impenetrable secret.

We have already demonstrated that the Ionim or aborigines of Greece were a race of barbarians; that consequently their language, or rather their jargon, was of the same contexture. The Pelasgi found both

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Language.

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The first
compound
words in
Greek.

158
Used in
composition.

160
Original
materials
of the
Greek language.

Pausan.
lib. 1.
cap. 22.

^{Greek Language.} the people and their speech in this uncultivated state. These people arrived in Greece about the year before Christ 1760. It was then that the language of Greece began to be cultivated. Before the age of Homer the work seems to have been completed. Nothing of consequence was afterwards added to the original stock; on the contrary, not a few moieties were deducted from the Homeric treasure. The Pelasgi, as was said before, arrived in Greece *an. ant. Chr. 1760*. Homer is thought to have been born *an. ant. Chr. 1041*; consequently the cultivation of the Greek tongue was completed in a period of about 700 years. But upon the supposition that Orpheus, Linus, Tamyris, &c. wrote long before Homer, as they certainly did, that language was arrived nigh the standard of perfection two centuries before; by which computation the period of its progress towards its stationary point is reduced to 500 years. But as the Pelasgi were a colony of foreigners, we ought to allow them one century at least to settle and incorporate with the natives, and to communicate their language, laws, manners, and habits, to the aborigines of the country. By this deduction we shall reduce the term of cultivation to less than four centuries.

During this period Greece was furiously agitated by tumults and insurrections. That country was divided into a number of independent states, which were perpetually engaged in quarrels and competitions. The profession of arms was absolutely necessary for the protection and preservation of the state; and the man of conduct and prowess was honoured as a demi-god, and his exploits transmitted with éclat to posterity. The Greek tongue was then rough and unpolished; because, like the ancient Romans, the bravest men were more disposed to act than to speak. Every language will take its colour from the temper and character of those who employ it; and had it not been owing to one class of men, the Greek tongue would have continued equally rough to the era of Homer as it had been a century after the arrival of the Pelasgi.

There has appeared among barbarous or half-civilized people a description of men whose profession it has been to frequent the houses or palaces of the great, in order to celebrate their achievements, or those of their ancestors, in the sublimest strains of heroic poetry. Accordingly we find that the Germans had their *bards*, the Gauls their *sads*, the Scandinavians their *scalds* or *scaldres*, the Irish their *fileas*, all retained for that very purpose. They lived with their chieftains or patrons; attended them to battle; were witnesses of their heroic deeds; animated them with martial strains; and celebrated their prowess if they proved victorious; or, if they fell, raised the song of woe, and chanted the mournful dirge over their sepulchres. These bards were always both poets and musicians. Their persons were held sacred and inviolable. They attended public entertainments, and appeared in all national conventions. The chief of them were employed in the temples of the gods; and the less illustrious, like our minstrels of old, strolled about from place to place, and exercised their functions wherever they found employment.

Among the ancient Greeks there was a numerous tribe of men of the very same description, who were at once poets and musicians, and whose office it was

to celebrate the praises of the great, and to transmit their exploits to posterity in the most exaggerated encomiums. These poetical vagrants were styled *aoidoi* or songsters. Some of these lived in the houses of great men; while others, less skilful or less fortunate, strolled about the country in the manner above described. The more illustrious of those *aoidoi* who were retained in the temples of the gods, were certainly the first improvers of the language of the Greeks. Among the Hebrews, we find the first poetical compositions were hymns in honour of Jehovah, and among the pagans the same practice was established. In Greece, when all was confusion and devastation, the temples of the gods were held sacred and inviolable. There the *aoidoi* improved their talents, and formed religious anthems on those very models which their progenitors had chanted in the east.

The language of the Greeks was yet rugged and unmellowed: their first care was to render it more soft and more flexible. They enriched it with vocables suited to the offices of religion; and these we imagine were chiefly imported from the east. Homer every where mentions a distinction between the language of gods and men. The language of gods imports the oriental terms retained in the temples, and used in treating of the ceremonies of religion; the language of men intimates the ordinary civil dialect which sprung from the mixed dialects of the country. The priests, no doubt, concurred in promoting this noble and important purpose. From this source the strolling *aoidoi* drew the rudiments of their art; and from these last the vulgar deduced the elements of a polished style.

To these *aoidoi* of the superior order we would ascribe those changes mentioned in the preceding part of this inquiry, by which the Greek tongue acquired that variety and flexibility, from which two qualities it has derived a great share of that ease, beauty, and versatility, by which it now surpasses most other languages. The diversity of its terminations furnishes a most charming variety, while at the same time the sense is communicated to the reader or hearer by the relation between them. By this economy the poet and the orator are left at liberty to arrange their vocables in that order which may be most soothing to the ear, and best adapted to make a lasting impression on the mind.

Few colonies have emigrated from any civilized country without a detachment of priests in their train. The supreme powers, whoever they were, have always been worshipped with music and dancing. The Hebrews, Phœnicians, and Egyptians, delighted in these musical and jocund festivals. The priests who attended the Iones, Dories, Æolians, Thebans, Athenians, &c. from the east, introduced into Greece that exquisite taste, those delicate musical feelings, which distinguished the Greeks from all the neighbouring nations. Hence that numerous race of onomatopœas, by which the Greek language is invested with the power of expressing almost every passion of the human soul, in such terms as oblige it to feel and actually to assimilate to the passion it would excite. Numberless instances of this occur in every page of Homer, Hesiod, Pindar, Sophocles, Euripides, and even of Aristophanes: to quote instances would be to insult the Greek student.

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Every body knows that the practice of writing in verse was antecedent to the date of prosaic composition. Here, then, the Ancients the ministers of religion chiefly displayed their skill and discernment. By a judicious mixture of short and long syllables; by a junction of consonants which naturally slide into each other; by a careful attention to the rhythm, or harmony resulting from the combination of the syllables of the whole line—they completed the metrical tone of the verse, guided by that delicacy of musical feeling of which they were possessed before rules of prosody were known among men.

Much liberty was certainly used in transposing letters, in varying terminations, in annexing prefixes and affixes, both to nouns and other kinds of words where such adjuncts were possible: and upon this occasion we think it probable, that those particles of which we have spoken above were inserted like filling stones thrust in to stop the gaps or chinks of a building. Verses were then clumsy and irregular, as the quantity of vowels was not duly ascertained, and the collision of heterogeneous consonants not always avoided. Probably these primitive verses differed as widely from the finished strains of Homer and his successors, as those of Chaucer and Spenser do from the smooth polished lines of Dryden and Pope.

The poetical compositions of the earliest Greeks were not, we think, in the hexameter style. As they were chiefly calculated for religious services, we imagine they resembled the Hebrew iambics preserved in the song of Aaron and Miriam, Deborah and Barak, Psalms, Proverbs, &c. which were indeed calculated for the same purpose. Archilochus perhaps imitated these, though the model upon which he formed his iambics was not generally known. The later dramatic poets seem to have copied from the same archetypes. Hexameters, it is probable, were invented by Orpheus, Linus, Tamyris, Musæus, &c. The first of these travelled into Egypt, where he might learn the hexameter measure from that people, who used to bewail *Maneros* and *Osiris* in elegiac strains. This species of metre was first consecrated to theology, and the most profound sciences of moral and natural philosophy; at length it was brought down to celebrate the exploits of kings and heroes.

*Res gestas resumque, ducumque et fortia bella,
Quo scribi possent numero monstravit* Homerus.

We have hazarded a conjecture above, importing that the earliest poetical compositions of the Greeks were consecrated to the service of the gods. We shall now produce a few facts, which will furnish at least a presumptive evidence of the probability of that conjecture.

Orpheus begins his poem with ancient chaos, its transformations and changes, and pursues it through its various revolutions. He then goes on to describe the offspring of Saturn, that is time, the æther, love, and light. In short, his whole poem is said to have been an oriental allegory, calculated to inspire mankind with the fear of the gods, and to deter them from murder, rapine, unnatural lusts, &c.

Musæus was the favourite scholar of Orpheus, or perhaps his son. He composed prophecies and hymns,

and wrote sacred instructions, which he addressed to his son. He prescribed atonements and lustrations; but his great work was a Theogony, or History of the Creation, &c.

Melanipus brought the mysteries of Proserpine from Egypt into Greece. He wrote the whole history of the disasters of the gods. This feat is mentioned by Homer himself.

Olen came from Lycia and composed the first hymn that was sung in Delos at their solemnities; he probably emigrated from Patara a city of Lycia, where Apollo had a celebrated temple and oracle.

The Hyperborean demigods used to visit Delos, where they chanted sacred hymns in honour of the Delian god.

To these we add the great Homer himself, it is deemed the hymns commonly annexed to the *Odyssey* are his composition. Hesiod's Theogony is too well known to need to be mentioned.

From these instances we hope it appears, that the origin of the poetry of Greece is to be found in the temples; and that there, its measure, numbers, rhythm, and other appendages were originally fabricated.

The Grecian poets, however, enjoyed another advantage which that class of writers have seldom possessed, which arose from the different dialects into which their language was divided. All those dialects were adopted indifferently by the prince of poets; a circumstance which enabled him to take a vantage of any word from any dialect, provided it suited his purpose. This, at the same time that it rendered versification easy, diffused an agreeable variety over his composition. He even accommodated words from Macedon, Epirus, and Illyricum, to the purposes of his versification: Besides, the laws of quantity were not then clearly ascertained; a circumstance which afforded him another convenience. Succeeding poets did not enjoy these advantages, and consequently have been more circumscribed both in their diction and numbers.

The Greek language, as is generally known, was divided into many different dialects. Every sept, or petty canton, had some peculiar forms of speech which distinguished it from the others. There were, however, four different dialectical variations which carried it over all the others. These were the Attic, Ionic, Æolic, and Doric. These four dialectical distinctions originated from the different countries in the east from which the tribes respectively emigrated. The Attics consisted, 1st, of the barbarous aborigines; 2d, of an adventitious colony of Egyptian Sais; 3d, a branch of Ionians from the coast of Palestine. These last formed the old Ionian dialect, from which sprang the Attic and modern Ionic. The Æolians emigrated from a different quarter of the same coast; the inhabitants of which were a remnant of the old Canaanites, and consequently different in dialect from the two first mentioned colonies. The Dorians sprang from an unpolished race of purple fishers on the same coast, and consequently spoke a dialect more coarse and rustic than any of the rest. These four nations emigrated from different regions; a circumstance which, in our opinion, laid the foundation of the different dialects by which they were afterwards distinguished.

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Melanipus,

168
Olen.

169
Homer and
Hesiod.

170
Different
dialects,
with their
origin.

16.
Earliest
Poet of
Greece.

165
Orpheus.

166
Musæus.

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It is impossible in this short sketch to exhibit an exact view of the distinguishing features of each dialect. Such an analysis would carry us far beyond the limits of the article in question. For entire satisfaction on this head, we must refer the Grecian student to Matthew's *Greek Lingua Dialecti*, where he will find every thing necessary to qualify him for understanding that subject. We shall content ourselves with the few observations following.

The Athenians being an active, brisk, volatile race, delighted in contractions. Their style was most exquisitely polished. The most celebrated authors who wrote in that dialect were the following: Plato, Thucydides, Xenophon, Demosthenes, and the other orators; Æschylus, Euripides, Sophocles, Aristophanes, Menander, Diphilus, with the other comic and tragic poets. That dialect was either ancient or modern. The ancient Attic was the same with the Ionic.

The Ionic, as was said, was the ancient Attic; but when that nation emigrated from Attica and settled on the coast of Asia Minor, they mingled with the Carians and Pelasgi and of course adopted a number of their vocabularies. They were an indolent, luxurious, and dissolute people; of course their style was indeed easy and flowing, but verbose, redundant, and without nerves. This, however, is the leading style in Homer; and after him a prodigious number of writers on every subject have used the same dialect, such as Herodotus of Halicarnassus the celebrated historian; Ctesias of Cnidos the historian of Persia and India; Hecateus of Miletus; Megasthenes the historian, who lived under Seleucus Nicator; Hippocrates the celebrated physician of Coos; Hellanicus the historian often mentioned with honour by Polybius; Anacreon of Teia; Alceus, Sappho of Lesbos, excellent poets; Pherecydes Syrus the philosopher, and a multitude of other persons of the same profession, whom it would be superfluous to mention upon the present occasion.

The Æolic and Doric were originally cognate dialects. When the Dorians invaded Peloponnesus and settled in that peninsula, they incorporated with the Æolians, and their two dialects blended into one produced the new Doric. The original Dore inhabited a rugged mountainous region about Ossa and Pindus, and spoke a rough unpolished language similar to the soil which they inhabited. Andreas Schottus, in his observations on poetry, l. 2. cap. 50. proves from an old manuscript of "Theocritus, that there were two dialects of the Doric tongue, the one ancient and the other modern; that this poet employed Ionic and the modern Doric; that the old Doric dialect was rough and cumbersome; but that Theocritus has adopted the new as being more soft and mellow." A prodigious number of poets and philosophers wrote in this dialect, such as Epicharmus the poet; Ibycus the poet of Rhegium; Corinna the poetess of Thebes, or Thebes, or Corinth, who bore away the prize of poetry from Pindar; Erynnæa poetess of Lesbos; Moschus the poet of Syracuse; Sappho the poetess of Mitylene; Pindarus of Thebes the prince of lyric-poets; Archimedes of Syracuse the renowned mathematician; and almost all the Pythagorean philosophers. Few historians wrote in that dialect; or if they did, their works have not

fallen into our hands. Most of the hymns sung in temples of the gods were composed in Doric; a circumstance which evinces the antiquity of that dialect, and which, at the same time, proves its affinity to the oriental standard.

After that the Greek tongue was thoroughly polished by the steps which we have endeavoured to trace in the preceding pages, conscious of the superior excellency of their own language, the Greeks, in the pride of their heart, stigmatized every nation which did not employ their language with the contemptuous title of *barbarians*. Such was the delicacy of their pampered ears, that they could not endure the untutored voice of the people whom they called *Barbarians*. This extreme delicacy produced three very pernicious effects; for, 1st, it induced them to metamorphose, and sometimes even to mangle, foreign names, in order to reduce their sound to the Grecian standard; and, 2d, it prevented their learning the languages of the east, the knowledge of which would have opened to them an avenue to the records, annals, antiquities, laws, customs, &c. of the people of those countries, in comparison of whom the Greeks themselves were of yesterday, and knew nothing. By this unlucky bias, not only they, but even we who derive all the little knowledge of antiquity we possess through the channel of their writings, have suffered an irreparable injury. By their transformation of oriental names they have in a manner stopped the channel of communication between the histories of Europe and Asia. This appears evident from the fragments of Ctesias's Persian history, from Herodotus, Xenophon, and all the other Grecian writers who have occasion to mention the intercourse between the Greeks and Persians. 3d, It deprived them of all knowledge of the etymology of their own language, without which it was impossible for them to understand its words, phraseology, and idioms, to the bottom. We mentioned Plato's *Cratylus* above. In that dialogue, the divine philosopher endeavours to investigate the etymology of only a few Greek words. His deductions are absolutely childish, and little superior to the random conjectures of a school-boy. Varro, the most learned of all the Romans, has not been more successful. Both stumbled on the very threshold of that useful science; and a scholar of very moderate proficiency in our days knows more of the origin of these two noble languages, than the greatest adepts among the natives did in theirs. By prefixes, affixes, transpositions of letters, new conjunctions of vowels and consonants for the sake of the music and rhythm, they have so disguised their words, that it is almost impossible to develop their original. As a proof of this, we remember to have seen a manuscript in the hands of a private person where the first twelve verses of the *Iliad* are carefully analysed; and it appears to our satisfaction that almost every word may be, and actually is, traced back to a Hebrew, Phœnician, Chaldean, or Egyptian original: And we are convinced that the same process will hold good in the like number of verses taken from any of the most celebrated poets of Greece. This investigation we found was chiefly conducted by reducing the words to their original inviolable state, which was done by stripping them of

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Language.

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The partiality of the Greeks to their own tongue, and in consequence of their evil consequences.

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Language

Beauty of
the Greek
language.

prefixes, affixes, &c. These strictures are, we think, well founded; and consequently need no apology to protect them.

These imperfections, however, are counterbalanced by numberless excellencies: and we are certainly much more indebted to that incomparable people for the information they have transmitted to us through the medium of their writings, than injured by them in not conveying to us and to themselves more authentic and more ample communications of ancient events and occurrences. Without fatiguing our readers with superfluous encomiums on a language which has long ago been extolled perhaps to an extravagant degree by the labours of men of the most enlarged capacity and the most refined taste, we shall now proceed to make a few observations on *spirits and accents*; which being rather appendages than essentials of the language, we have on purpose reserved for the last place.

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The spiri-
tus asper
and lenis.

Every word in the Greek language beginning with a vowel is marked with a spirit or breathing: This aspiration is double, namely *lenis et asper*, "the gentle, and rough or aspirated." The gentle accent, though always marked, is not now pronounced: though in the earliest periods of the language it was undoubtedly enounced, though very softly. Both these aspirations were imported from the east. They were actually the Hebrew *he* and *beth*. The former denoted the *spiritus lenis*, and the latter the *spiritus asper*. The Hebrew prefixed *ha* or *he* to words beginning with a vowel, and of course the Greeks followed their example. These people seem to have delighted in aspirates; and of consequence the letter *h* is, some think, rather too often affixed to the terminations of their words. Every word beginning with *h* had the aspirate joined to *h*, probably with a design to render the aspiration still more rough.

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The ac-
cents.

The Greek accents are three in number; the acute, the grave, and the circumflex. The acute raises and sharpens the voice; the grave depresses and flattens it; the circumflex first raises and sharpens the voice, and then depresses and flattens it. It is obviously composed of the other two. The learned author of the *Origin and Progress of Language* has taken much pains to prove that these accents were actually musical notes, invented and accommodated to raise, depress, and suspend the voice, according to a scale of musical proportions. It is scarce possible, we think, for a modern Greek scholar to comprehend distinctly the ancient theory of accents. These the native Greeks learned from their infancy, and that with such accuracy, that even the vulgar among the Athenians would have hissed an actor or actress off the stage or an orator off the pulpitum ‡, on account of a few mistakes in the enunciation of those notes.

‡ See Pul-
pitum.

These elevations, depressions, and suspensions of the voice upon certain syllables, must have made their language sound in the ears of foreigners somewhat like recitative, or something nearly resembling *cant*. But the little variety of those syllabic tones, and the voice not resting upon them, but running them on without interruption, sufficiently distinguished them from music or *cant*. Be that as it may, we think it highly probable, that the wonderful effects produced by the harangues of the orators of Greece on the en-

raptured minds of their hearers, were owing in a good measure to those artificial musical tones by which their syllables were so happily diversified.

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To this purpose we shall take the liberty to transcribe a passage from Dion. Halic. *De Structura Orationis*, which we find translated by the author of the *Origin and Progress of Language*, vol. ii. book 3d, partii. chap. 7. page 381. "Rhetorical composition is a kind of music differing only from song or instrumental music, in the degree, not in the kind; for in this composition the words have melody, rhythm, variety, or change, and what is proper or becoming: So that the ear in it, as well as in music, is delighted with the melody, moved by the rhythm, is fond of variety, and desires with all these what is proper and suitable. The difference, therefore, is only of greater and less."

With respect to accents, it may be observed that only one syllable of a word is capable of receiving the acute accent, however many there be in the word. It was thought that the raising the tone upon more than one syllable of the word, would have made the pronunciation too various and complicated, and too like chanting.

The *grave accent* always takes place when the acute is wanting. It accords with the level of the discourse; whereas the acute raises the voice above it.

The *circumflex accent* being composed of the other two, is always placed over a long syllable, because it is impossible first to elevate the voice and then to depress it on a short one. Indeed among the Greeks a long syllable was pronounced like two short ones; and we apprehend it was sometimes written so, especially in later times. It is altogether obvious from two learned Greek authors, Dion. Halic. and Aristoxenus, that the Greek accents were actually musical notes, and that these tones did not consist of loud and low, or simply elevating and depressing the voice; but that they were uttered in such a manner as to produce a melodious rhythm in discourse.

In a word, the acute accent might be placed upon any syllable before the antepenult, and rose to a *fifth* in the diatonical scale of music; the grave fell to the third below it. The circumflex was regulated according to the measure of both, the acute always preceding. The grave accent is never marked except over the last syllable. When no accent is marked, there the grave always takes place. Some words are called *enclitics*. These have no accent expressed, but throw it back upon the preceding word. The circumflex, when the last syllable is short, is often found over the penult, but never over any other syllable but the last or the last but one.

The ancient Greeks had no accentual marks. They learned those modifications of voice by practice from their infancy; and we are assured by good authority, that in pronunciation they observe them to this day. The accentual marks are said to have been invented by a famous grammarian, Aristophanes of Byzantium, keeper of the Alexandrian library under Ptolemy Philopater, and Epiphaneus, who was the first likewise who is supposed to have invented punctuation. Accentual marks, however, were not in common use till about the seventh century; at which time they are found in manuscripts. If our curious readers would wish to enter more deeply into the theory of accents, we must

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The an-
cient Greeks
had no ac-
centual
marks.

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must remit them to Origin of Language, vol. ii. l. 2. *passim*; and to Mr Foster's Essay on the different Nature of Accent and Quantity.

Such, in general, are the observations which we thought the nature of our design obliged us to make on the origin and progress of the Greek language. Some of our more learned readers may perhaps blame us for not interspersing the whole disquisition with quotations from the most celebrated writers in the language which has been the object of our researches. We are well aware that this is the general practice in such cases. The books were before us, and we might have transferred from them more quotations than the nature of an article of this kind would permit. In the first part there were no books in that language to quote from, because the Greeks knew nothing of their own origin, nor of that of their language, and consequently have recorded nothing but dreams and fictions relating to that subject. Even when we had made considerable progress in our inquiry, the nature of the plan we have adopted excluded in a great measure the use of quotations. When we drew near the conclusion, we imagined that our learned readers would naturally have recourse to the passages alluded to without our information, and that the unlearned would not trouble themselves about the matter. The Greek student who intends to penetrate into the depths of this excellent language, will endeavour to be thoroughly acquainted with the books after mentioned.

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Books to be
studied by
every one
who wishes
to be a mas-
ter of this
language.

Aristotle's Rhetoric and Poetics, his book *De Interpretatione*, especially with Ammonius's Commentary. Ammonius was a native of Alexandria, and by far the most acute of all the ancient grammarians.

Dion. Halic. *De Structura Orationis*, where, amidst abundance of curious and interesting observations, will be found the true pronunciation of the Greek letters.

Demetrius Phalereus *De Elocutione*; a short essay indeed, but replete with instruction concerning the proper arrangement of words and members in sentences.

Longinus, the prince of critics, whose remains are
§ See *Gaza*. above commendation. Theodorus Gaza† and the other refugees from Constantinople, who found an hospitable reception from the munificent family of the Medici, and whose learned labours in their native language once more revived learning and good taste in Europe. These, with some other critics of less celebrity, but equal utility, will unlock all the treasures of Grecian erudition, without however disclosing the source from which they flowed. To these one might add a few celebrated moderns, such as Mons. Fourmont the Elder, Mons. Gebelin, Abbé Pezron, Salmatius, and especially the learned and industrious Lord Monboddo.

We shall now give a very brief account of the vast extent of the Greek language even before the Macedonian empire was erected; at which period, indeed, it became in a manner universal, much more than ever the Latin language could accomplish notwithstanding the vast extent of the Roman empire.

177
Vast extent
of the
Greek lan-
guage.

Greece, originally Hellas, was a region of small extent, and yet sent out many numerous colonies into different parts of the world. These colonies carried their native language along with them, and industriously diffused it wherever they formed a settlement. The Ionians,

Æoles, and Dories, possessed themselves of all the west and north-west coast of the Lesser Asia and the adjacent islands; and there even the barbarians learned that polished language. The Greek colonies extended themselves along the south coast of the Euxine sea as far as Sinope, now Trebizund, and all the way from the west coast of Asia Minor: though many cities of barbarians lay between, the Greek tongue was understood and generally spoken by people of rank and fashion.

Greek
Language.

There were Greek cities on the north coast of the Euxine sea to the very eastern point, and perhaps beyond even those limits; likewise in the Taurica Chersonesus, or Crim Tartary; and even to the mouth of the Danube, the straits of Caffa, &c. In the neighbourhood of all these colonies, the Greek language was carefully propagated among the barbarians, who carried on commerce with the Greeks.

A great part of the south of Italy was planted with Greek cities on both coasts; so that the country was denominated *Magna Græcia*. Here the Greek tongue universally prevailed. In Sicily it was in a manner vernacular. The Ionians had sent a colony into Egypt in the reign of Psammetichus; and a Greek settlement had been formed in Cyrenia many ages before. The Phocians had built Madaia or Marseilles as early as the reign of Cyrus the Great, where some remains of the Greek language are still to be discovered. Cæsar tells us, that in the camp of the Helvetii registers were found in Greek letters. Perhaps no language ever had so extensive a spread, where it was not propagated by the law of conquest.

The Greek tongue, at this day, is confined within very narrow limits. It is spoken in Greece itself, except in Epirus, and the western parts of Macedonia. It is likewise spoken in the Grecian and Asiatic islands in Candia or Crete, in some parts of the coast of Asia Minor, and in Cyprus: but in all these regions, it is much corrupted and degenerated.

178
Greek spoken at present.

As a specimen, we shall insert a modern Greek song, and the advertisement of a quack medicine, which, with other plunder, was brought by the Russians from Choclim or Chotzim in 1772.

Song in modern Greek.

ΜΙ δυστυχὴς πολέμῳ μὲ βασιλεὺς ὡς τὸ ληρὶ
Εἶμαι, καὶ κεντρίω, καὶ ἂν χὰρὰ κοίτω
Στο πλάγος τῶν συμφορῶν μὲ ἰσχυρίζομαι καί.
Μ' ἀντὶς ὁλαβὴς σφοδρῆς καὶ κατ' ἔτος.
Μὲ κινεῖα πολλὰ καὶ μὲν τρεῖς ἀκαταμάχ.
Θαλασσα φρονομένη, πολλὰ ἀγρίομαι,
"Ὅσῳ ἀφ' ἐξέ καὶ φασὶ μὲ σαγματοῦν περὶ
Σύνερα σκοτισμένα καὶ κατασχευόμενα,
Καὶ τὰ φασὶ μὲ τρεῖς, τὰ ἰδοὶ τὰ μάτι μὲν
Γλυχὰ κερὰ τὰ ἴσα, κισχὰ καὶ δι' ἰσχυρῶν,
Ν' ἀρξῶ καὶ δι' ἀπορῶν καὶ ἀπὸ τῶν ἰσχυρῶν.
Μ' ἀποκρίναν θροῦν οὐκ ἔχω τὸ ἴσον.
Πῶ μὲ ἀπὸ τὴν νε πῶρ ἢ σφαιρὶ τὰ ἴσα,
Καὶ τὰ ἂν βασιλεὺς, ἑκατόν ἂν μὲ φελαξῶν.

Translation.

With dire misfortunes, pains, and woes,
O'erwhelm'd, ingulph'd, I struggling fight;
O'er my frail bark proud billows close
To plunge her deep in lasting night.

Rev.

Latin
Language

of Ancient Nations, &c. Whether the old Celtic differed essentially from the Pelasgic and Etruscan, would be a matter of curious investigation, were this a proper subject for the present article.

The Latin abounds with oriental words, especially Hebrew, Chaldaic, and Persian. These are certainly remains of the Pelasgic and Etruscan tongues, spoken originally by people who emigrated from regions where those were parts of the vernacular language.—The Greeks, in polishing their language, gradually distorted and disfigured vast numbers of the rough eastern vocables, which made a very great part of it. (See the preceding section).

The Romans, of less delicate organs, left them in their natural state, and their natural air readily bewrays their original. We had collected a large list of Latin words still current in the east; but find that Thomassin† and Ogerius (v), and especially Mons. Gebelin, in his most excellent Latin Dictionary, have rendered that labour superfluous.

In this language, too, there are not a few Gothic terms. How these found their way into the Latin, it is not easy to discover, unless, as Pelloutier supposes, the Celtic and Gothic languages were originally the same: or perhaps we may conjecture, that such words were parts of a primitive language, which was at one time universal.

There are, besides, in the Latin a great number of obsolete Greek words, which were in process of time obliterated, and others substituted in their room: so that, upon the whole, we are persuaded, that the most effectual method to distinguish the difference between the early and modern Greek, would be to compare the ancient Latin with the latter; there being, we imagine, very little difference between the ancient Greek and Latin in the earliest periods.

However that may be, it is certain that the Roman letters were the same with the ancient Greek.—*Formæ literis Latinis quæ veterrimis Græcorum*, says Tacitus*; and Pliny† says the same thing, and for the truth of his assertion he appeals to a monument extant in his own times.

These old Greek letters were no other than the Pelasgic, which we have shown from Diodorus Siculus (see preceding Section) to have been prior to the Cadmean. For the figure of these letters, see Asle, Postellus, Montfaucon, Palæographia Græca, Mons. Gebelin, and our Plates IX and X.

That the Latins borrowed the plan of their declensions from the Greeks, is evident from the exact resemblance of the terminations of the cases throughout the three similar declensions. In nouns of the first declension, the resemblance is too palpable to stand in need of illustration. In the second, the Greek ge-

nitive is *α*. In Latin the *ο* is thrown out, and the termination becomes *i*. In the Greek section, we have observed, that the sounds of *i* and *ο* differed very little; therefore the Latins used *i*, instead of *ο*. The Latin dative ends in *ο*, which is the Greek dative, throwing away *ι*, *subscriptum*, which was but faintly founded in that language. No genuine Greek word ended in *α* or *μ*.

The Hellenes seemed to have abhorred that bellowing liquid; it is, however, certain that they imported it from the east, as well as the other letters, and that they employed it in every other capacity, except in that of closing words. In the termination of flexions, they changed it into *ν*.

The Latins retained *m*, which had been imported to them as a terminating letter at an era before the Greek language had undergone its last refinement.—Hence the Latin accusative in *um*, instead of the Greek *ον*. The vocative case, we imagine, was in this declension originally like the nominative. The Latins have no dual number, because, in our opinion, the Æolian dialect, from which they copied, had none. It would be, we think, a violent stretch of etymological exertion, to derive either the Latin genitive plural of the second declension from the same case of the Greek, or that of the latter from the former; we therefore leave this anomaly, without pretending to account for its original formation. The third declensions in both languages are so exactly parallel, that it would be superfluous to compare them. The dative plural here is another anomaly, and we think a very disagreeable one, which we leave to the conjectures of more profound etymologists.

For the other peculiarities of Latin nouns, as they are nearly similar to those of the Greek, we must beg leave to remit our readers to that section for information.

The Latins have no articles, which is certainly a defect in their language. The Pelasgic, from which they copied, had not adopted that word in the demonstrative sense. Homer indeed seldom uses it; and the probability is, that the more early Greek used it less frequently, at least in the sense above-mentioned. Thus in Latin, when I say, *video hominem*, it is impossible to find out by the bare words whether the word *hominem* intimates “a man,” or “the man;” whereas in Greek it would be *Βαίω ἀνθρώπον*, *I see a man*, *Βαίω τον ἀνθρώπου*, *I see the man*. Hence the first expression is indefinite, and the second definite.

The substantive verb *sum* in Latin seems to be partly formed from the Greek and partly not. Some of the persons of the present tense have a near resemblance to the Greek verb *ειμι* or *εἰμι*, while others vary widely from that archetype. The imperfect præterite and

τυραννοί; which was their true name, for they actually emigrated from Tarsus, or the western coast of Asia Minor, and consequently Herodotus everywhere calls them *τυραννοί*. The Æolians changed *α* into *υ*; hence in that dialect they were called *τυραννυαί*, from *Tarsus*. The Romans styled them *Tusci*, probably from the Greek verb *θυσιάζω*, *sacrifico*, alluding to the skill which that people possessed in the ceremonies of religion. They called their country *Æturgia*, we think from the Chaldaic word *heretum*, “a magician or forcerer;” a name deduced from their skill in divination.

(v) *Græca et Latina lingua Hebraizantes*, Venice 1763. If these books are not at hand, Dr Littleton's Dictionary will, in a good measure, supply their place.

† Glossary.

182
How far
the Latin
resembles
the Greek.

* Tacitus,
Anal.
lib. ii.
† Nat. Hist.
lib. vii.
cap. 58.

183
Deficiency
of articles.

184
Origin of
the substantive
verb.

Latin
Language.

and præterperfect have nothing common with the Greek verb, and cannot, we think, be forced into an alliance with it. The future *ero* was of old *eso*, and is indeed genuine Greek. Upon the whole, in our apprehension the Latin substantive verb more nearly resembles the Persian verb *hæsa* than that of any other language we are acquainted with.

185
And of
other verbs.

From what exemplar the Latin verbs were derived, is not, we think, easily ascertained. We know that attempts have been made to deduce them all from the Æolic Greek, and that the Romans themselves were extremely fond of this chimera; but the almost numberless irregularities, both in the formation and conjugation of their verbs, induce us to believe that only a part of them were formed upon that model. We are apt to think that the terminations in *bam, bas, but, hamus*, &c. are produced by their union with a fragment of some obsolete verb, which is now wholly lost. In the verb *amo*, e. g. we are sure that the radix *am* is the Hebrew word *mether*; but how *am-abam, am-abo, am-arm* were fabricated, and connected with the radical *am*, is not so easily determined. That Latin verbs are composed of an inflexible radix and another flexible verb, as well as the Greek, cannot be doubted; but what this flexible auxiliary was, we think, cannot now be clearly ascertained. It is not altogether improbable that such parts of the verbs as deviate from the Greek archetype were supplied by fragments of the verb *ba*, which pervades all the branches of the Gothic language, and has, we think, produced the Latin verb *habeo*. When the Greeks began to etymologize, they seldom overpassed the verge of their own language: the Latins pursued nearly the same course. If their own language presented a plausible etymology, they embraced it; if not, they immediately had recourse to the Greek; and this was the *ne plus ultra* of their etymological researches. Cicero, Quintilian, Festus, &c. and even Varro, the most learned of all the Romans, stop here; all beyond is either doubt or impenetrable darkness. The opinion above-mentioned we offer only as a conjecture; the decision we leave to more able critics.

186
Deficiencies
in Latin
verbs.

The want of aorists or indefinite tenses seems to us a palpable defect in the Latin language. The use of these among the Greeks enabled the writer to express the specific variations of time with more accuracy and precision than the Latins, who never attempted to specify them by any other tenses but the imperfect and pluperfect. Indeed we should imagine, that both the Greeks and Latins were much inferior to the English in this respect. The Latin word *lego*, for example, may be translated into English three different ways: 1st, *I read*; 2d, *I do read*; 3d, *I am reading*.

187
Irregularities
in the
conjugation.

The Latins, in reducing verbs to their four conjugations, formed their inflexions in a very irregular manner. Many verbs of the first class inflect their præterite and supine like those of the second: thus *domo*, instead of giving *avi* and *atum*, has *ui* and *itum*, like *monui* and *monitum*. Again, not a few verbs of the third conjugation have *ui* and *itum*, as if they belonged to the fourth; e. g. *peto, petivi, petitum*. Then, some verbs have *bi* in the present, *bi* in the præterite, and *itum* in the supine, while, contrary to the rules of analogy, they in reality belong to the third: such are *cupio, cupivi, cupitum, cupere*, &c. Some verbs of the

second conjugation have their præterite and supine as if they belonged to the third; thus, *jubeo, jussi, jussum, julare; auxo, auxi, auxum, auxere*. Some verbs, which are actually of the fourth conjugation, have their præterite and supine as if they were of the third; thus *sentio, sensi, sentum, sentire; haurio, hauri, haurum, haurire*, &c. If there are not manifest irregularities, we cannot say what deserves the name. The fact seems to stand thus: The Romans were originally a banditti of robbers, bankrupts, runaway slaves, shepherds, husbandmen, and peasants of the most unpolished character. They were engaged in perpetual broils and quarrels at home, and seldom enjoyed repose abroad. Their profession was robbery and plunder. Like old Ishmael, their hands were against every man, and every man's hand against them. In such a state of society no time was left for cultivating the sciences. Accordingly the arts of war and government were their sole profession. This is so true, that their own poet characterizes them in the following manner:

Excitant animi spirantia mollius æra, &c.

188
The Latin
deficient in
participles.

Another blemish in the Latin tongue is occasioned by its wanting a participle of the præterite tense in the active voice. This defect is perpetually felt, and is the cause of an awkward circumlocution wherever it happens to present itself. Thus, "The general having crossed the river, drew up his army;" *Imperator, cum transisset flumen, aciem instruxit*. Here *cum transisset flumen* is a manifest circumlocution, which is at once avoided in the Greek *ἔχεν πέρασεν τὴν ποταμὸν*, &c. This must always prove an incumbrance in the case of active intransitive verbs. When active deponent verbs occur, it is easily avoided. Thus, "Cæsar having encouraged the soldiers, gave the signal for joining battle;" *Cæsar cohortatus milites, prælii committendi signum dedit*.

Another palpable defect in this language arises from the want of a participle of the present passive. This again must produce an inconveniency upon many occasions, as will be obvious to every Latin student almost every moment.

189
The Latin
deficient in
gerunds.

The two supines are universally allowed to be substantive-nouns of the fourth declension. How these assumed the nature of verbs it is not easy to determine. When they are placed after verbs or nouns, the matter is attended with no difficulty; but how they should acquire an active signification, and take the case of the verb with which they are connected, implies, we should think, a stretch of prerogative.

The Latin gerunds form another unnatural anomaly. Every Latin scholar knows that those words are nothing but the neuters of the participles of the future passive. The fabricators of the Latin tongue, however, elevated them from their primary condition, giving them upon many occasions an active signification. In this case we must have recourse to

Sic utitur.
Quem pater adlatruncum se esse perit, noma se puerum.

Another inconveniency, perhaps more severely felt than any of the preceding, arises from the want of the use of the present participle of the verb *sum*. Every body knows what a convenience is derived from the frequent use of the participle *being* in Greek; and indeed it appears to us somewhat surprising that the

Latin
Language.

Latins neglected to introduce the participle *ens* into their language. In this we believe they are singular. Here again a circumlocution becomes necessary in such a case as the following: "The senate being at Rome, passed a decree." Instead of saying *senatus ens Romæ, legem tulit*, we are obliged to say *cum senatus Romæ esset*, &c. If the words *ens* or *existens* had been adopted, as in the Greek, this odious circumlocution would have been avoided.

Many other defects of the like kind will occur to every person who shall choose to search for them, and those in the most approved classical authors. Perhaps our mentioning so many may be deemed invidious by the admirers of that language; but we write from conviction, and that must be our apology.

190
Different
genius of
the Latin
and Greek
languages.

If one take the trouble to compare the structure of the Greek and Latin languages, he will, we think, quickly be convinced that their characteristic features are extremely different. The genius of the former seems easy and natural; whereas that of the latter, notwithstanding the united efforts of poets, orators, and philosophers, still bears the marks of violence and restraint. Hence it appears that the Latin tongue was pressed into the service, and compelled almost against its will to bend to the laws of the Grecian model. Take a sentence of Hebrew, Chaldean, Arabian, &c. and try to translate it into Greek without regarding the arrangement of the words, and you will find it no difficult attempt; but make the same trial with respect to the Latin, and you will probably find the labour attended with considerable difficulty. To translate Greek into English is no laborious task; the texture of the two languages is so congenial, that the words and phrases, and even the idiomatic expressions, naturally slide into each other. With the Latin the case is quite otherwise; and before elegant English can be produced, one must deviate considerably from the original. Should we attempt to translate a piece of English into Greek, and at the same time into Latin, the translation of the former would be attended with much less difficulty than that of the latter, supposing the translator equally skilled in both languages.

191
Causes of
this dif-
ference.

This incongruity seems to spring from the following cause. Before any man of considerable abilities, either in the capacity of a poet, grammarian, or rhetorician, appeared at Rome, the language had acquired a strong and inflexible tone, too stubborn to be exactly moulded according to the Grecian standard. After a language has continued several centuries without receiving a new polish, it becomes like a full grown tree, incapable of being bent to the purposes of the mechanic. For this reason, it is highly probable, that the tongue in question could not be forced into a complete assimilation with the Greek. Notwithstanding all these obstructions, in process of time it arrived at such an exalted pitch of perfection, as to rival, perhaps to excel, all the other European languages, the Greek only excepted. Had men of the taste, judgment, and industry of Ennius, Plautus, Terence, Cicero, and the worthies of the Augustan age, appeared in the early

stages of the Roman commonwealth, we may believe that their language would have been thoroughly reduced to the Grecian archetype, and that the two dialects might have improved each other by a rivalry between the nations who employed them.

Without pretending to entertain our readers with a pompous and elaborate account of the beauties of that imperial language which have been detailed by writers almost without number, we shall endeavour to lay before them as briefly as possible its pristine character, the steps and stages by which it gradually rose to perfection, the period when it arrived at the summit of its excellence, and by what means it degenerated with a rapid career till it was lost among those very people to whom it owed its birth.

We have observed already, that the Latin tongue was a *collocution* of all the languages spoken by the va-
grant people who composed the first elements of that republic. The prevailing dialects were the Pelasgic or Etruscan, which we think were the same; and the Celtic, which was the aboriginal tongue of Italy. Hence the primary dialect of the Romans was composed of discordant materials, which in our opinion never acquired a natural and congenial union. Be that as it may, this motley mixture was certainly the original dialect of the Romans. The Pelasgic or Etruscan part of it retained a strong tincture of the oriental style. The Celtic part seems to have been prevalent, since we find that most of the names of places (2), especially in the middle and northern parts of Italy, are actually of Celtic original. It is therefore clear that the style of the first Romans was composed of the languages above-mentioned. Who those first Romans were, we believe it is impossible to determine with any degree of certainty. The Roman historians afford us as little information upon that subject, as their etymologists do upon the origin of their language. Their most celebrated writers upon this point were Ælius Gallus, Quintus Cornificius, Nonius Marcellus, Festus, and some others of less note. At the head of these we ought to place Terentius Varro, whom Cicero styles the most learned of all the Romans. From these writers we are to expect no light. Their etymologies are generally childish and futile. Of the language of the most ancient Romans we can only reason by analogy; and by that rule we can discover nothing more than what we have advanced above.

192
The Latin
tongue
composed
chiefly of
Pelasgic
and Celtic
words.

In the first place we may rest assured that the dual number, the articles, the participle above-mentioned, the aorists, and the whole middle voice, never appeared in the Latin tongue; and accordingly were not current in those languages from which it was copied, at least at the time when it was first fabricated.

Besides all this, many circumstances concur to make it highly probable that, in the earliest periods of the language, very few inflexions were introduced. 1st, When the Pelasgi left Greece, the Greek language itself was not fully polished. 2d, The Arcadians were never thoroughly cultivated. They were a rustic pastoral people, and little minded the refinements of a civilized

(2) For proof of this our readers may consult Abbé Pezron, Pelloutier, Bullet's *Mém.* Gebelin *Pres. Diss.* Lat. and many others.

Latin
Language.* Dion.
Halicar.
lib. 1.

vilized state; consequently the language they brought into Italy at that era must have been of a coarse and irregular texture. 3d. When the Thessalian* Pelasgi arrived in Italy about the time of Deucalion, the Greek itself was rude and barbarous; and, which is still of more consequence, if we may credit Herodotus quoted in the former Section, that people had never adopted the Hellenic tongue. Hence it appears, that the part of the Latin language derived from the Pelasgic or Etruscan (for those we believe to have been the same) must have taken a deep tincture from the oriental tongues (See preceding Section). If we may judge of the Celtic of that age by that of the present, the same character must likewise have distinguished its structure.

193
Hence little
infected in
its original
state.* Lib. 2.
lib initio.

From these circumstances, we think it appears that the earliest language of the Romans was very little diversified with inflexions. It nearly resembled the oriental exemplar, and consequently differed widely from the modern Latin. The effect of this was, that the modern Romans could not understand the language of their early progenitors. Polybius*, speaking of the earliest treaty between the Romans and Carthaginians, makes the following observation: "Believe me (says he), the Roman language has undergone so many changes since that time (A) to the present, that even those who are most deeply skilled in the science of antiquities cannot understand the words of that treaty but with the greatest difficulty."

From this source we make no doubt has flowed that vast number of oriental words with which the Latin language is impregnated. These were originally inflexible, like their brethren of the east. They were not disguised as they now are with prefixes, affixes, metapheses, syncopas, antitheses, &c. but plain and undorned in their natural dress.

194
Dion. after-
wards into
the Gre-
cian model.

After the Romans became acquainted with the Æolian Greeks, who gradually seized upon both coasts of Italy towards the south, which they called *Magna Græcia*, they began to affect a Grecian air, and to torture their language into that foreign texture. It appears, however, that at first the Grecian garb sat rather awkwardly, and several marks of violence were easily discerned. The most ancient specimen of this kind that we can recollect consists of the remains of the *twelve tables*. Here every thing is rude and of a clumsy cast; for though by this time considerable progress had been made in refinement, and the language of Rome had begun to appear in a Grecian uniform, still those changes were not altogether natural. Soon after appeared Marcus Fabius Pictor and Sisenna; historians often quoted by Livy, but whose works are long since irrecoverably lost. The *Fasti Capitolini* are often mentioned; but they too perished in the burning of the Capitol during the civil wars between Marius and Sylla. Had those monuments escaped the ravages of time, we should have been able to mark the progress of the Latin tongue from stage to stage, and to ascertain with the greatest accuracy its gradual configuration in the course of its progress towards the Grecian

standard. We must therefore leave the Latin tongue during those periods rude and barbarous, and descend to others better known and more characteristically marked. Those commenced after that

*Græcia capta ferum victorem cepit et artes
Intulit agresti Latio.*

Latin
Language.

In this period we find Ennius, who wrote a Roman history in hexameter verse in 18 books, which he called *Annals*; most part of which is now lost. He likewise translated *Eubemerus de Origine Deorum*; a work often mentioned by the Christian fathers in their disputes with the Pagans. It is sometimes quoted by Cicero. Then followed Caius Lucilius the famous satyrist, and a number of other writers, such as Accius, Valerius, Æditiuus, Alpinus, &c. whose fragments were published by the Stephens, Paris, 1564. All these imitated the writers of Greece or translated from them. By their perseverance and active exertions the spirit of these authors was transfused into the Latin tongue, and its structure accommodated to the Grecian plan.

Plautus and Terence, by translating the comedies of Menander and Diphilus into their own language, taught the Latin muses to speak Attic Greek. To speak that language was then the *ton* of the times, as it is now with us to chatter French. Greek tutors were retained in every reputable family; and many Romans of the first rank were equally qualified to speak or write both in Greek and Latin. The original jargon of Latium was now become obsolete and unintelligible; and Cato the Ancient condescended to learn the Greek language at 80.

To pretend to enumerate the various, and we may add inimitable, examples of the Augustan or golden age of the Roman tongue, would be an insult to the understanding of our readers: we shall only take the liberty to translate a few lines from a most excellent historian*, who, had his honesty been equal to his judgment, might have rivalled the most celebrated writers of his country. Having observed, that the Greek authors, who excelled in every province of literature, had all made their appearance nearly about the same space of time, confined within very narrow limits, he adds, "Nor was this circumstance more conspicuous among the Greeks than among the Romans; for unless we go back to the rough and unpolished times, which deserve commendation only on account of their invention, the Roman tragedy is confined to Accius and the period when he flourished. The charming wit of Latin elegance was brought to light by Cæcilius, Terentius, and Afranius, nearly in the same age. As for our historians (to add Livy also to the age of the former), if we except Cato and some old obscure ones, they were all confined to a period of 80 years; so neither has our stock of poets extended to a space much backward or forward. But the energy of the bar, and the finished beauty of prose eloquence, setting aside the same Cato (by leave of P. Crassus, Scipio, Lælius, the Gracchi, Fannius, and Ser. Galba, be it spoken), broke out all at once under Tully the prince of

(A) This treaty, according to the same historian, was concluded in the consulship of Lucius Junius Brutus and Marcus Valerius, 28 years before Xerxes made his descent upon Greece.

Latin
Language.

his profession; so that one can be delighted with none before him, and admire none except such as have either seen or were seen by that orator."

197
Causes of
the decay
of the Latin
tongue.

From this quotation it plainly appears, that the Romans themselves were convinced of the short duration of the golden age of their language. According to the most judicious critics, it commenced with the era of Cicero's oratorical productions, and terminated with the reign of Tiberius, or perhaps it did not reach beyond the middle of that prince's reign. It is generally believed that eloquence, and with it every thing liberal, elevated, and manly, was banished Rome by the despotism of the Cæsars. We imagined that the transition was too instantaneous to have been entirely produced by that unhappy cause. Despotism was firmly established among the Romans about the middle of the reign of Augustus; and yet that period produced such a group of learned men as never adorned any other nation in so short a space of time. Despotism, we acknowledge, might have affected the eloquence of the bar; the noble and important objects which had animated the republican orators being now no more: But this circumstance could not affect poetry, history, philosophy, &c. The style employed upon these subjects did not feel the fetters of despotism. The age of Louis XIV. was the golden period of the French tongue; and we think that age produced a race of learned men, in every department superior in number and equal in genius to the literati who flourished under the same age, though the latter is universally allowed to have been the golden period of this country. The British Isles, we hope, enjoy still as much liberty as ever; yet we believe few people will aver, that the writers of the present age are equal either in style or in genius to that noble group who flourished from the middle of the reign of Charles I. to the middle of the reign of George II. and here despotism is quite unconcerned.

In the east the same observation is confirmed. The Persians have long groaned under the Mohammedan yoke; and yet every oriental scholar will allow, that in that country, and under the most galling tyranny, the most amazing productions of taste, genius, and industry, that ever dignified human nature, have been exhibited. Under the Arabian caliphs, the successors of Mohammed, appeared writers of a most sublime genius, though never was despotism more cruelly exercised than under those fanatics. The revival of letters at the era of the reformation was chiefly promoted and cherished by petty despotical princes.

We cannot therefore be persuaded to agree, that the despotism of the Cæsars banished eloquence and learning from Rome. Longinus indeed has attributed this misfortune to that cause, and tells us, *καὶ τὸ πρῶτον ἡ ἀρχὴ τῆς βασιλείας, καὶ τὸ δεύτερον ἡ ἐξουσία, &c.* "It is liberty that is formed to rouse the sentiments of great geniuses, to push forward the propensity of contest, to inspire them with hopes, and the generous ambition of being the first in rank." When Longinus wrote this, he did not reflect that he himself was a striking instance of the unsoundness of his observation.

As to science, the fact is undoubtedly on the other side. That Seneca was superior to Cicero in philoso-

phy, cannot be reasonably contradicted. The latter had read, and actually abridged, the whole extent of Grecian philosophy: this displayed his reading rather than his learning. The former had addicted himself to the stoic sect; and though he does not write with the same flow of eloquence as Tully, he thinks more deeply and reasons more closely. Pliny's Natural History is a wonderful collection, and contains more useful knowledge than all the writings of the Augustan age condensed into one mass. We think the historical annals of Tacitus, inferior to Livy in style and majesty of diction, much superior in arrangement and vigour of composition. In short, we discover in these productions a deep insight into human nature, an extensive knowledge of the science of government, a penetration which no dissimulation could escape, together with a sincere attachment to truth both with respect to events and characters; nor is he inferior in the majesty, energy, and propriety of his harangues, wherever an equal opportunity presents itself. Quintilian, Pliny the younger, Sætonius, Petronius Arbiter, and Juvenal, deserve high esteem; nor are they inferior to their immediate predecessors. We think there is good reason to conclude, that the loss of liberty among the Romans did not produce the extinction of eloquence, science, elevation of sentiment, or refinement of taste. There were, we believe, other circumstances which chiefly contributed to produce that revolution.

The same Valerius Paterculus whom we have quoted assigns some plausible and very judicious reasons for this catastrophe. "Emulation (says he) is the nurse of genius; and one while envy, and another admiration, fires imitation. According to the laws of nature, that which is pursued with the greatest ardour mounts to the top: but to be stationary in perfection is a difficult matter; and by the same analogy, that which cannot go forward goes backward. As at the outset we are animated to overtake those whom we deem before us, so when we despair of being able to overtake or to pass by them, our ardour languishes together with our hope, and what it cannot overtake it ceases to pursue; and leaving the subject as already engrossed by another, it looks out for a new one upon which to exert itself. That by which we find we are not able to acquire eminence we relinquish, and try to find out some object upon which to employ our intellectual powers. The consequence is, that frequent and variable transitions from subject to subject proves a very great obstacle to perfection in any profession."

This perhaps was the case with the Romans. The heroes of the Augustan age had borne away the prize of eloquence, of history, of poetry, &c. Their successors despaired of being able to equal, much less to surpass them, in any of these walks. They were therefore laid under the necessity of striking out a new path by which they might arrive at eminence. Consequently Seneca introduced the *stile curé*, as the French call it; that is, a short, sparkling, figurative diction, abounding with antitheses, quaintnesses, witticisms, embellished with flowers and meretricious ornaments; whereas the style of the Augustan age was natural, simple, solid, unaffected, and properly adapted to the nature of the subject and the sentiments of the author.

The historian Sallust laid the foundation of the unnatural

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Language.

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The writers
of the latter
ages of
science than
the prede-
cessors.

Latin Language. natural style above mentioned. Notwithstanding all the excellencies of that celebrated author, he every where exhibits an affectation of antiquity, an antithetical cast, an air of austerity, an accuracy, exactness, and regularity, contrary to that *air dégagé* which nature displays in her most elaborate efforts. His words, his clauses, seem to be adjusted exactly according to number, weight, and measure, without excess or defect. Velleius Paterculus imitated this writer; and, as is generally the case with imitators, succeeded best in those points where his archetype had failed most egregiously. Tacitus, however excellent in other respects, deviated from the Augustan exemplars, and is thought to have imitated Sallust; but affecting brevity to excess, he often falls into obscurity. The other contemporary writers employ a cognate style; and because they have deviated from the Augustan standard, their works are held in less estimation, and are thought to bear about them marks of degeneracy.

That degeneracy, however, did not spring from the despotic government under which these authors lived, but from that affectation of singularity into which they were led by an eager but fruitless desire of signaling themselves in their mode, as their predecessors had done in theirs. But the mischiefs of this rage for innovation did not reach their sentiments as it had done their style; for in that point we think they were lost far from falling below the measure of the writers of the former age, that in many instances they seem to have surpassed them.

With respect to sentiment and mental exertions, the authors in question preserved their vigour, till luxury and effeminacy, in consequence of power and opulence, enervated both the bodies and minds of the Romans. The contagion soon became universal; and a listless, or intellectual torpor, the usual concomitant of luxury, spread indolence over the mental faculties, which rendered them not only averse to, but even incapable of, industry and perseverance. This lethargic disposition of mind seems to have commenced towards the conclusion of the silver age; that is, about the end of the reign of Adrian. It was then that the Roman eagles began to poop, and the genius of Rome, as well in arts as in arms, began to decline. Once more, the decadence of the intellectual powers of the writers of that nation did not arise from the form of the government, but from the causes above specified.

As the Roman genius, about that period, began to decline, so the style of the silver age was gradually vitiated with barbarisms and exotic forms of speech. The multitudes of barbarians who flocked to Rome from all parts of the empire; the ambassadors of foreign princes, and often the princes themselves, with their attendants; the prodigious numbers of slaves who were entertained in all the considerable families of the capital, and over all Italy; the frequent commerce which the Roman armies upon the frontiers carried on with the barbarians; all conspired to vitiate the Latin tongue, and to interlard it with foreign words and idioms. In such circumstances, it was in possible for that or any other language to have continued pure and unadulterated.

This vitiated character of style and sentiment became more and more prevalent, in proportion as it descended from the reign of Adrian towards the era

of the removal of the imperial seat from Rome to Constantinople. Then succeeded the iron age, when the Roman language became absolutely rude and barbarous.

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Towards the close of the silver, and during the whole course of the brazen age, there appeared, however, many writers of no contemptible talents. The most remarkable was Seneca the stoic, the master of Nero, whose character both as a man and a writer is discussed with great accuracy by the noble author of the *Characteristicks*, to whom we refer our readers.

About the same time lived Terentius the satyrist, the friend and disciple of the stoic Cornutus; to whose precepts, as he did honour by his virtuous life, so his works, though small, show an early proficiency in the science of morals.

Under the mild government of Adrian and the Antonines lived Aulus Gellius, or (as some call him) Agellius; an entertaining writer in the miscellaneous way, well skilled in criticism and antiquity. His works contain several valuable fragments of philosophy, which are indeed the most curious part of them.

With Aulus Gellius we may range Macrobius; not because a contemporary (for he is supposed to have lived under Honorius and Theodosius), but from his near resemblance in the character of a writer. His works, like those of the other, are miscellaneous; filled with mythology and ancient literature, with some philosophy intermixed.

In the same age with Aulus Gellius flourished Apuleius of Madaura in Africa; a Platonic writer, whose matter in general far exceeds his perplexed and affected style, too conformable to the false rhetoric of the age when he lived.

Boethius was descended from one of the noblest of the Roman families, and was consul in the beginning of the fifth century. He wrote many philosophical works; but his ethic piece on the Consolation of Philosophy deserves great encomiums, both for the matter and the style; in which latter he approaches the purity of a far better age than his own. By command of Theodoric king of the Goths this great and good man suffered death; with whom the Latin tongue, and the last remains of the Roman dignity, may be said to have sunk in the western world.

There were besides a goodly number both of poets and historians who flourished during this period; such as Silius Italicus, Claudian, Ausonius, &c. poets and historians to a very great number, for our readers may consult *l'Hist. Litt. de l'Europe*.

There flourished, too, a number of ecclesiastical writers, some of whom deserve great commendation. The chief of these is Lactantius, who has been deservedly distinguished with the title of the *Christian Cicero*.

The Roman authors amount to a very great number in comparison of the Greek. As to the manner, which we consider the chief defect of the Roman empire, we are fully satisfied that the Latin tongue, even in the best age, was never so pure as the Greek. We think we have given a tolerable account of the progress of the Roman language, from the foundation of the empire to the removal of the imperial seat from Rome to Constantinople.

Upon the whole, the progress of the Roman language, from the foundation of the empire to the removal of the imperial seat from Rome to Constantinople, is a subject of great interest. The grandeur of the propriety which it was possessed of, the

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and usefulness
of the
Latin
tongue.Celtic
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the lustre of its writers; the empire which it still maintains among ourselves; the necessity we are under of learning it in order to obtain access to almost all the sciences, may even to the knowledge of our own laws, of our judicial proceedings, of our charters; all these circumstances, and many others too numerous to be detailed, render the acquisition of that imperial language in a peculiar manner at once improving and highly interesting. Spoken by the conquerors of the ancient nations, it partakes of all their revolutions, and bears continually their impression. Strong and nervous while they were employed in nothing but battles and carnage, it thundered in the camps, and made the proudest people to tremble, and the most despotic monarchs to bend their stubborn necks to the yoke. Copious and majestic, when, weary of battles, the Romans inclined to vie with the Greeks in science and the graces, it became the learned language of Europe, and by its lustre made the jargon of savages disappear who disputed with it the possession of that quarter of the globe. After having controlled by its eloquence, and humanized by its laws, all those people, it became the language of religion. In short, the Latin language will be studied and esteemed as long as good sense and fine taste remain in the world.

Sect. IX. Celtic, Gothic, and Slavonian Languages.

§ 1. Of the Celtic Language.

In treating of the origin of the Latin tongue (see Section VIII.), we observed that a great part of it is derived from the Celtic. We shall now endeavour to give some account of the origin and extent of that ancient language; still leaving the *minutiae* to grammars and dictionaries, as we have done with respect to the other dialects which have fallen under our consideration. Our candid readers, it is hoped, will remember, that we are acting in the character of philologists, not in that of grammarians and lexicographers.

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Origin of
the Celts.

The descendants of Japhet having peopled the western parts of Asia, at length entered Europe. Some broke into that quarter of the globe by the north, others found means to cross the Danube near its mouth. Their posterity gradually ascended towards the source of that river; afterwards they advanced to the banks of the Rhine, which they passed, and thence spread themselves as far as the Alps and the Pyrenean hills.

These people, in all probability, were composed of different families; all, however, spoke the same language; their manners and customs bore a near resemblance; there was no variety among them but that difference which climate always introduces. Accordingly they were all known, in the more early times, by the general name of *Celto-sythæ*. In process of time, becoming exceedingly numerous, they were divided into several nations, which were distinguished by different names and territorial appellations. These who inhabited that large country bounded by the ocean, the Mediterranean, the Rhine, the Alps, and the Pyrenees, were denominated *Gauls* or *Celts*. Those people multiplied so prodigiously in the space of a few centuries, that the fertile regions which they then occupied could not afford them the means of subsistence. Some of them now passed over into Britain; others

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Part of
whom were
denominated
Gauls

crossed the Pyrenees, and formed settlements in the northern parts of Spain. Even the formidable barriers of the Alps could not impede the progress of the Gauls: they made their way into Italy, and colonized those parts which lie at the foot of the mountains; whence they extended themselves towards the centre of that rich country.

By this time the Greeks had landed on the eastern coast of Italy, and founded numerous colonies in those parts. The two nations vying as it were with each other in populousness, and always planting colonies in the course of their progress, at length encountered about the middle of the country. This central region was at that time called *Latium*. Here the two nations formed one society, which was called the *Latin people*. The languages of the two nations were blended together; and hence, according to some, the Latin is a mixture of Greek and Gaelic.

As the Gauls were a brave and numerous people, they certainly maintained themselves in their pristine possessions, uninvaded, unconquered, till their civil animosities and domestic quarrels exposed them as a prey to those very Romans whom they had so often defeated, and sometimes driven to the brink of destruction. They were not a people addicted to commerce; and, upon the whole, considering their situation both in their primary seats and afterwards in Italy, they had little temptation or opportunity to mingle with foreigners. Their language, therefore, must have remained unmixed with foreign idioms. Such as it was when they settled in Gaul, such it must have continued till the Roman conquests. If therefore there is one primitive language now existing, it must be found in the remains of the Gaelic or Celtic. It is not, then, surprising, that some very learned men, upon discovering the coincidence of very great numbers of words in some of the Greek dialects with other words in the Celtic, have been inclined to establish a strict affinity between those languages. The ancient Pelasgic and the Celtic at least must have nearly resembled each other, admitting a dialectical difference only, and that discrimination which climate and a long period of time must always produce.

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Re-
semblance be-
tween their
language
and that
of the Pe-
lasgi.

Some have thought that the Gauls lost the use of their native language soon after their country was conquered by the Romans; but *Monsieur Bullet*, in his *Memoires de la Langue Celtique*, has proved almost to a demonstration, that the vulgar among those people continued to speak it several centuries after that period. When a great and populous nation has for many ages employed a vernacular tongue, nothing can ever make them entirely relinquish the use of it, and adopt unmixed that of their conquerors.

Many learned men, among whom is the lexicographer above-mentioned, have shown that all the local names in the north of Italy are actually of Celtic extraction. These names generally point out or describe some circumstances relating to the nature of their situation; such as exposure, eminence, lowness, moistness, dryness, coldness, heat, &c. This is a very characteristic feature of an original language; and in the Celtic it is so prominent, that the Erse names of places all over Scotland are, even to this day, peculiarly distinguished by this quality. We have heard a gentleman, who was well skilled in the dialect of the Celtic still spoken

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in the Highlands of Scotland, propose to lay a bet, at very great odds, that if one should pronounce the name of any village, mountain, river, gentleman's seat, &c. in the old Scottish dialect, he should be able, by its very name, to give a pretty exact description of its local situation.

To discover the sources from which the Celtic tongue is derived, we must have recourse to the following expedients.

1. We must consult the Greek and Latin authors, who have preserved some Gaelic or Celtic terms in their writings.

2. We must have recourse to the Welsh and *Basse Bretagne* dialects; in which, indeed, there are many new words, but these are easily distinguished from the primitive stock.

3. If one would trace another source of the Celtic, he must converse with the country people and peasants, who live at a distance from cities, in those countries where it was once the vernacular tongue. We have been credibly informed, that a Highland gentleman, crossing the Alps for Italy, accidentally fell in with an old woman, a native of those parts, who spoke a language so near akin to his native Erse, that he could understand her with little difficulty; and that she, on the other hand, understood most of his words. That an event of this nature should actually take place is by no means surprising, when we consider that the Erse spoken in the Highlands of Scotland is perhaps the most genuine remnant of the Celtic now existing, and at the same time reflect that there may be some remote cantons among those wild and inaccessible mountains, the Alps, where some remains of that tongue may be still preserved.

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The most
genuine re-
mains of
the Celtic
in the
Highlands
of Scot-
land.

4. We have said, that the most genuine remains of the Gaelic tongue are to be found in the Highlands of Scotland; and the reason is obvious. The Scottish Highlanders are the unmixed unconquered posterity of the ancient Britons, into whose barren domains the Romans never penetrated; not, we imagine, because they were not able, since they subdued both North and South Wales, equally inaccessible, but because they found no scenes there either to fire their ambition or allure their avarice. Amidst all the revolutions that from time to time shook and convulsed Albion, those mountainous regions were left to their primitive lords, who, like their southern progenitors, hospitable in the extreme, did not, however, suffer strangers to reside long among them. Their language, accordingly, remained unmixed, and continues so even to this day, especially in the most remote parts and unfrequented islands.

The Norwegians subdued the western islands of Scotland at a time when the Scottish monarchy was still in its minority. They erected a kind of principality over them, of which the isle of *Man* was the capital. Though they maintained the sovereignty of those islands for some centuries, built many forts, and strengthened them with garrisons, and in fine were the lawgivers and administrators of justice among the natives; yet we have been informed by the most respectable authority, that there is not at this day a single vocable of the Norse or Danish tongue to be found among those islanders. This fact affords a demonstration of that superstitious attachment with which they were devoted to their vernacular dialects.

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The Welsh
dialect not
pure, nor
the Irish.

The Welsh dialect cannot we think be pure and unsophisticated. The *Silures* were conquered by the Romans, to whom they were actually subject for the space of three centuries. During this period, a multitude of Italian exotics must have been transplanted into their language; and indeed many of them are discernible at this day. Their long commerce with their English neighbours and conquerors hath adulterated their language, so that a great part of it is now of an English complexion. The Irish is now spoken by a race of people whose morality and ingenuity are nearly upon a level. Their latest historians have brought them from the confines of Asia, through a variety of adventures, to people an island *extra anni solisque vias*. However this genealogical tale may please the people for whom it was fabricated, we must still suspect that the Irish are of Celtic extraction, and that their forefathers emigrated from the western coast of Britain at a period prior to all historical or even traditional annals. Ireland was once the *native land of saints*. The chief actors on this sordid stage were Romanists, and deeply tinctured with the superstition of the times. They pretended to improve the language of the natives; and whatever their success was, they improved it in such a manner as to make it deviate very considerably from the original Celtic; so that it is not in Ireland that we are to look for the genuine characters of the dialect under consideration.

Though the Hibernian tongue, in our opinion, differs considerably from the original Celtic, some very ingenious essays have been lately published by the learned and laborious members of the *Antiquarian Society of Dublin*; in which the coincidence of that tongue, with some of the oriental dialects, has been supported by very plausible arguments. In a dissertation published in the year 1772, they have exhibited a collection of *Punico-Maltese* words compared with words of the same import in Irish, where it must be allowed the resemblance is palpable. In the same dissertation they have compared the celebrated *Punic* scene in Plautus with its translation into the Irish; in which the words in the two languages are surprisingly similar. If those criticisms are well founded, they will prove that the Celtic is coeval and congenial with the most ancient languages of the east; which we think highly probable. Be that as it may, the Danes and Norwegians formed settlements in Ireland; and the English have long been sovereigns of that island. These circumstances must have affected the vernacular idiom of the natives; not to mention the necessity of adapting the language of the conquerors in law, in sciences, in the offices of religion.

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Coinci-
dence be-
tween the
Celtic and
Phœnician.

The inhabitants of the highlands and islands of Scotland are the descendants of those Britons who fled from the power of the Romans, and sheltered themselves among the fens, rocks, and fastnesses of those rugged mountains and sequestered glyns. They preferred these wastes and wilds, with liberty and independence, to the pleasant and fertile valleys of the south, with plenty embittered by slavery. They no doubt carried their language along with them; that language was a branch of the Celtic. With them, no doubt, fled a number of the druidical priests, who unquestionably knew their native dialect in all its beauties and

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Language

and varieties. These fugitives in process of time formed a regular government, elected a king, and became a considerable state. They were frequented by their situation from the rest of the world. Without commerce, without agriculture, without the mechanical arts, and without objects of ambition or emulation, they devoted themselves wholly to the pastoral life as their business, and to hunting and fishing as their diversion. These people were not distinguished by an improving genius; and consequently their language must have remained in the same state in which they received it from their ancestors. They received it genuine *Celtic*, and such they preserved it.

When the Scots became masters of the low country, and their kings and a great part of the nobility embraced the Saxon manners, and adopted the Saxon language, the genuine Caledonians tenaciously retained their native tongue, dress, manners, clanships, and feudal customs, and could never cordially assimilate with their southern neighbours. Their language, therefore, could not be polluted with words or idioms borrowed from a people whom they hated and despised. Indeed it is plain from the whole tenor of the Scottish history, that neither Caledonian chieftains, nor their vassals, were ever iteably attached to the royal family after they fixed their residence in the low country, and became *Saxons*, as the Highlanders called them by way of reproach. Indeed the commerce between them and those of the south, till about a century and a half ago, was only transient and accidental; nor was their native dialect in the least affected by it.

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Causes of
the purity
of the
Scottish dia-
lect of this
ancient lan-
guage.

Their language, however, did not degenerate, because there existed among them a description of men whose profession obliged them to guard against that misfortune. Every chieftain retained in his family a bard or poet laureat, whose province it was to compose poems in honour of his lord, to commemorate the glorious exploits of his ancestors, to record the genealogy and connections of the family; in a word, to amuse and entertain the chief and his guests at all public entertainments and upon all solemn occasions. Those professors of the Parnassian art used to vie with each other; and the chiefs of families often assembled their respective bards, and encouraged them by considerable premiums to exert their poetic talents. The victor was rewarded and honoured; and the chieftain deemed it an honour to himself to entertain a bard who excelled his peers. The ancient Gauls, as we learn from Diodorus Siculus, Strabo, Tacitus, Lucan, &c. entertained persons of that profession; and certainly the ancient Britons did the same. Those bards were highly revered; their persons were deemed sacred; and they were always rewarded with salaries in lands or cattle (See section *Greek*.) Those poetic geniuses must have watched over their vernacular dialect with the greatest care and anxiety; because in their compositions no word was to be lost, but as many gained as possible.

The use of letters was not known among the ancient *Celts*; their druidical clergy forbade the use of them. All their religious rites, their philosophical dogmas, their moral precepts, and their political maxims, were composed in verses which their pupils were obliged to commit to memory. Accordingly letters

were unknown to the Caledonian Scots, till they learned them either from their southern neighbours or from the Romans. The Irish, indeed, pretend to have letters of a very ancient date; the Highlanders of the country in question make no claim to the use of that invention. Their bards, therefore, committed every thing to memory; and of course the words of their language must have been faithfully preserved. We find that the celebrated poems of Ossian, and others of an inferior character, or at least fragments of such poems (see *Ossian*), have thus been preserved from father to son for more than 1000 years. The beauty, significance, harmony, variety, and energy of these verses, strike us even in a prose translation: how infinitely more charming must they appear in their native form and poetical attire!

In order to exhibit the genius of the Celtic in as striking a light as the nature of our present design will permit, we shall lay before our readers a very contracted sketch of the Gaelic or Caledonian dialect as it now stands; which we hope will go a great way to convince them that this is the genuine offspring of the other. In doing this we shall borrow many hints from a gentleman whose learning seems to equal his zeal for his native language; which, in compliance with the modern practice, we shall for the future distinguish by the name of *Gaelic*.

F. Tyt,
See by
James
Grant,
Esq; ad-
vocate.

The Gaelic is not derived from any other language as far as we know, being obviously reducible to its own roots. Its combinations are formed of simple words of a known signification; and those words are resolvable into the simplest combinations of vowels and consonants, and even into simple sounds. In such a language we may expect that some traces will be found of the ideas and notions of mankind living in a state of primeval simplicity; and if so, a monument is still preserved of the primitive manners of the Celtic race while as yet under the guidance of simple nature, without any artificial restraint or controul.

The sudden sensations of heat and cold, and bodily pain, are expressed by articulate sounds, which, however, are not used in this language to denote heat, cold, or bodily pain. A sudden sensation of heat is denoted by an articulate exclamation *hau*; of cold, by *id*; of bodily pain, by *oich*. All these sounds may be called *interjections*, being parts of speech which discover the mind to be seized with some passion. Few of the improved languages of Europe present so great a variety of sounds which instantaneously convey notice of a particular passion, bodily or mental feeling.

The pronouns *he* and *she* are expressed by the simple sounds *e* and *i*, and these are the marks of the masculine and feminine genders; for a neuter gender is unknown in the *Gaelic*. The compositions of rude and barbarous ages are universally found to approach to the style and numbers of poetry; and this too is a distinguishing character of the *Gaelic*. Bodily subsistence will always be the principal concern of an uncultivated people. Hence *ed* or *eid* is used upon discovery of any animal of prey or game: it is meant to give notice to the hunting companion to be in readiness to seize the animal: and hence we believe *edo* "to eat" in Latin, and *ed* in Irish, signifies "cattle;" likewise in Scotch *ead* "cattle," literally signifies "the

“the offspring or generation of cattle.” *Cud* or *cuel*, “share or portion of any subject of property,” literally “common food.” *Faed* “hunting,” literally “getting of food.” *Edra* “the time of the morning when cattle are brought home from pasture to give milk,” literally “meal-time.” These are words importing the simplicity of a primitive state, and are common in the Gaelic idiom.

Traces of imitative language remain in all countries. The word used for *caw* in the Gaelic language is *ca*, plainly imitating the lowing of that animal.

In joining together original roots in the progress of improving language and rendering it more copious, its constituent parts discover an admirable justness and precision of thought, which one would scarce expect to find in an uncultivated dialect. It will, however, be found, upon examination, that the Gaelic language, in its combination of words, specifies with accuracy the known qualities, and expresses with precision the nature and properties which were attributed to the object denominated.

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It is a tendency
of Gaelic
compounds

An appears to have been a word of frequent use in this language, and seems to have been originally a name applied indefinitely to any object. According to *Buliet*, it was used to signify “a planet;” hence the *sin* had the name of *grian*, which is a compound of *gri* “hot,” and *an* “a planet.” *Re* signifies originally and radically “division.” The changes of the moon and the variety of her phases were early employed to point out the divisions of time. The present name for the moon is *gaulach*; a word derived from her whiteness of colour. To these we might add a vast number more whose signification precisely indicates their shape, colour, effects, &c. Many of these words will be found exactly similar to Greek and Latin words of the same sound and signification. In order to satisfy our curious readers, we shall annex a few, though some of them may perhaps be questionable.

The *Venus* of the Latins is said to be a compound of *ben* and *ina*, which literally signify “the first woman,” the letter *b* in Gaelic being softened into *v*. *Ben* and *ina* signify “food.” These words are compounded of the Gaelic words *ed* or *eid* and *ar*; the former denotes food simply, and the latter ploughed land. These are the roots of the Greek and Latin words *edea*, *ar* = *aro*. *Fea*, which signifies “a seat,” has an evident reference to food. It is compounded of two Gaelic words *ed* and *ira*, which literally signify “meal-time.” *Fea*, which signifies “the presents which a bridegroom made to his bride,” is a compound of two Gaelic words *ed* and *na* or *nuah*, literally signifying “raw food.” From *ar* there are many Greek derivatives. *Agropia* signifies “ploughed land,” also “crop of corn;” *Arus* “bread.” In Gaelic a crop of corn and bread are expressed by *ar-thar*, commonly pronounced *aran* and *aran*; all being equally derivatives of the root *ar*. So the Greek and Latin words *arabos*, *arabike*, “arabic;” *aratrum*, “a plough;” *arator*, “a ploughman;” and many others, are evidently derived from the same source. We would not, however, suggest, in consequence of this coincidence, that either the Greek or Latin lan-

guages were derived from the Gaelic; we rather believe that these are remains of a primeval tongue, which are still retained in all the three; and we produce them upon the present occasion as presumptions that the Gaelic is an original, underived language, and of course the most pure and unadulterated relic of the Celtic now existing. If our readers should incline to know more of this subject, they may consult *Pezron's Origin of Ancient Nations*, *Buliet's Mem. de la Langue Celtique*, *Parfen's Rom. of Japhet*, *Cicero's, de Nat. Germ.* &c.

Celtic
Language.

When the Celtic language was generally spoken over Europe, it seems to have been amazingly copious. By consulting *Buliet's Memoires*, it appears that its names for the common and various objects of nature were very numerous. The words denoting water, ever, wood, forest, mountain, lake, &c. were most precisely accommodated to specify each modification and variety, with such peculiar exactness as even the Greek, with all its boasted idiomatical precision and copiousness, has not been able to equal. The appearances which diversify the visible face of inanimate nature, arrest the attention of men in an uncultivated state. Unaccustomed to thought and abstract reasoning, their minds expand and exercise their powers upon sensible objects, and of course mark every *minutia* and almost imperceptible distinction with an accuracy to us seemingly impossible.

We hope it now appears to every reader, that the Celtic was one of the dialects of the primitive language; that it once overspread by far the greatest part of Europe; that the Gaelic now spoken in the northern parts of Scotland and the adjacent islands is the most pure and unadulterated relic of that tongue now anywhere existing. We would willingly refer our readers to some well composed grammar of that language; but indeed we know of none that deserves our recommendation. Some years ago we were flattered with the prospect of seeing one published by a gentleman whose deep skill in that language is universally acknowledged. We have likewise heard of an intended dictionary of the same tongue; but hitherto our hopes have been disappointed.

We are, however, happy to find that there is now publishing an excellent translation of both the Old and New Testaments into Gaelic, which has hitherto been a desideratum among those who speak this language. Such a translation will at once contribute to preserve that ancient tongue, and disseminate the knowledge of the truth among the natives of that country.

Every assistance towards acquiring the knowledge of a tongue which was once universal over a great part of Europe, will certainly be an acceptable present to the public. The antiquary, who is desirous of tracing the affinity of languages, and wishes to mark the migrations of people, ought certainly to apply himself to the study of its remaining branches; and, if we mistake not, he will soon be convinced, that they all breathe a spirit congenial to the manners and sentiments of a people who are just entering upon the first stage of improvement and civilization.

Perhaps it may be expected, that, before we conclude this short sketch of the Celtic tongue, we should give

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try which extended from the confines of Thrace to the banks of the Danube: were a brave and virtuous people; and spoke the same language with the Thracians, with whom they are often confounded both by Greek and Roman historians.

But the name of *Gothi* is by no means so ancient. It was utterly unknown both to the ancient Greeks and Romans. The first time that the name *Goth* is mentioned is in the reign of the Emperor Decius, about the year of Christ 250. About that time they burst out of Getia, and rushing like a torrent into the empire, laid waste every thing with fire and sword. The name of their leader or king was *Cniva*. Decius, endeavouring to expel them from Thrace, was vanquished and slain.

After this irruption, we find them frequently in the Latin authors under the name of *Geta* or *Gothi*; tho' the Greeks generally denominate them *Sythæ*. Torseus tells us, that *got* and *got* is actually the same word, which anciently, according to him, denoted a "soldier." *Got* in Icelandic signifies a "horse or horseman," and *gata* a "wanderer;" and this last was perhaps the import of the term *Geta*, they being originally an unsettled vagrant people. As nations generally assume to themselves some high auspicious denomination, we may believe the Goths did the same. We may therefore rest satisfied, that the *Geta* assumed the Icelandic name above mentioned as their national one: or perhaps, notwithstanding their Greek denomination, they called themselves *Gots* or *Goths* from the beginning.

History of Norway, 2b. 1.

The original seat of the Goths was the country now called *Little Tartary*, into which they had extended themselves from the frontiers of Thrace. This country was called *Little Scythia* by the Greek writers; and it was the station whence those innumerable swarms advanced, which, in conjunction with the Arian and other barbarous tribes, at length overran and subverted the western empire. One part of the Gothic nation was allowed by Constantine to settle in Mesia. Before the year 420 most of the Gothic nations who had settled within the limits of the Roman empire had been converted to the Christian faith; but, unhappily, the greater part of the apostles by whom they had been proselyted, were Arians, which proved fatal to many of the orthodox Christians; for the Arian Goths persecuted them with unrelenting cruelty.

215 Their primary seat.

About the year 367, Uphilas bishop of the Mesian Goths, translated the New Testament into the Gothic language. The remains of this translation furnish a genuine, and at the same time venerable, monument of the ancient Gothic dialect. No more is now extant of that valuable translation than the four Gospels, and another fragment containing part of the epistle to the Romans. The Gospels have been repeatedly published since the first edition by Junius 1665, down to that of Mr. Lye. Other fragments of the Gothic language have also been found, which our curious readers may see in Lye's Notes to his Edition of the Gothic Gospels. The fragment of the Epistle to the Romans was lately discovered in the library at Wolfenbottle, and published by Kistel archdeacon of Wolfenbottle.

216 Remains of genuine Gothic.

The Goths, prior to the age of Uphilas, were ig-

norant of the use of alphabetical characters. The bishop fabricated an alphabet for them, which is a medley of Greek and Roman letters, but rather resembling to the former.

Gothic Language, 217 Gothic Alphabet.

This alphabet consists of 24 letters (see PLATE IX). Junius has carefully analysed these letters, and pointed out their powers and sounds in his Gothic alphabet, prefixed to his *Glossarium Gothicum*. They were long retained in all the European languages derived from the Gothic source, which will be enumerated in the sequel.

What kind of language the ancient Gothic was, is plain from the fragments above mentioned; but in what respects it agrees with the oriental tongues, or differs from them, is not easy to ascertain with precision. We have observed in our section on the Greek, that a considerable part of that language must have been derived from the Thracian; which, according to Strabo there quoted, was the same with the Getic or Gothic. The Thracian tongue will, we are convinced upon comparison, be found analogous to the Chaldean or Syrian. The German, which is a genuine descendant of the Gothic, is full of Persian words; the old Persian or Pahlavi appears to be a dialect of the Chaldean. The learned Junius, near the beginning of his Gothic alphabet, remarks, that a very considerable part of the language in question is borrowed from the most ancient Greek.

218 Gothic language derived from the Chaldean, &c.

Both the learned Ibre in his *Glossarium Suis Gothicum*, and Wachter in his excellent German and Latin Dictionary, often remark the coincidence of Gothic and German words with oriental vocables of the like sound and of the same signification. In the old Saxon, which is another ramification of the Gothic tongue, numberless terms of the very same complexion appear. From this deduction we hope it will follow, that the Gothic tongue, in its original unmixed state as it was spoken by the ancient *Geta*, was a dialect of the primeval language; that language which the sons of Tiras brought with them from the plains of Shinar or from Armenia, or from any other region where the primitive mortals had fixed their residence. To confirm this position, we shall annex a few instances.

The Thracian tribes, in all probability, first took possession of those parts of Asia Minor which stretch towards the east. Thence they crossed the Hellespont, and spread themselves far and wide northward. Strabo supposes that they first settled in the regions to the north of those straits, and thence transported numerous colonies into Asia Minor. The reverse was probably the case. Population, we think, proceeded northward: but be that as it may, it is universally agreed, that both sides of the Hellespont were peopled with Thracians.

In Asia Minor we meet with the city *Perga*, which, throwing away the *a*, is *Perg*. In every tongue descended from the Gothic, the word *berg* signifies a "rock," and metaphorically a "town or burgh;" because towns were originally built on rocks for the sake of defence. Hence likewise *Paganus*, the fort or citadel of Troy. *Berg* in Thracian signified a "city;" the Chaldean and Hebrew word *Ber* imports a "well," and is possibly the original of the Gothic word *ber*, *ale*. In ancient times, especially in

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the East, it was customary to build cities in the neighbourhood of mountains. The ancients called the Phrygians *Brigæ*, *Briges* or *Bruges*; the Gothic word coinciding is obvious. *Dindannus*, the name of a city sacred to Cybele, is compounded of two Gothic words *din* and *dann*, both signifying "a height, an eminence;" and hence *a town, an inclosure*. The word *trus* seems to be the very Gothic *truh*, "brave, valiant." The words *fider*, *mader*, *dehner*, *truder*, are so obviously Persian, that every etymologist has assigned them to that language.

Many futile etymologies have been given of the sacred name *God*, which is in reality the Persian word *Choddi*, commonly applied by them to their *Hormazd* or *Oromazdes*. The Persian *bad* or *bad* signifies a "city;" the same word in Gothic imports a "house, a mansion, an abode." *Band*, in Persian, a "holy place;" in Gothic, "to bend." *Helm* or *ham*, "a house," is generally known to be of Persian original. Much critical skill has been displayed in tracing the etymology of the Scotch and old English word *Yule*, "Christmas." *Yule*, derived from *iul*, was a festival in honour of the sun, which was originally celebrated at the winter solstice. *Wick* or *wich* is a Gothic term still preserved in many names of towns; it signifies "a narrow corner, or small strip of land jutting into the sea, or into a lake or river;" hence Latin *vicius*, and the Greek *vicus*. In Spanish we have many old Gothic words; among others *hoya* a "son," the same with the Greek *hios*. In some places of Scotland, we call any thing that is little, small, *wee*; originally spelt *wei*, if we mistake not, from the very same word.

These few examples we have thrown together, without any regard to order, persuaded that almost every word of the language, truly Gothic, may with a little pains and judgment be traced to some oriental root or cognate. We may observe in passing, that many Gothic nouns end in *a*, like the Chaldaic and Syriac; that their substantive verb very much resembles that of the Persian, Greek, and Latin; and that their active and auxiliary verb has furnished the common præterperfect tense of Greek verbs in the active voice: that verb is *haban*, but originally *ha*, as the common people pronounce it at this day, especially in the north of Scotland, and among the Swedes, Danes, Norwegians, and Icelanders.

We shall now leave the other inferior arrangements of this ancient language to grammarians and lexicographers, and proceed to inquire what modern tongues are deduced from it as their stock, and which of them makes the nearest approaches to its simplicity and rusticity.

We have already observed that the Goths, formerly *Getæ*, were possessed of a vast extent of country, reaching from the frontiers of Thrace to the banks of the Ister or Danube. We have seen that a colony of them settled in Mœsia under Constantine II. They then spread themselves into Dacia, and from thence into Germany. All these countries were situated in such a manner, that the progress of population was forward, and according to the natural course of emigration. From Germany they extended themselves into Scandinavia, that is, Sweden, Denmark, and Norway. Their whole ancient *Edda*, *Sagas*, "Chro-

nicles," show that the Goths arrived in Scandinavia by this route, without, however, fixing the era of that event with any tolerable degree of accuracy. By the Germans, we believe the ancients understood all the nations eastward, westward, and northward, reaching from the Danube on the south up to the extremity of Scandinavia on the Northern Ocean; and from the Rhine and German Ocean on the west, to the river Chronus or Niemen on the east. All those nations spoke one or other of the Gothic dialects, some approaching nearer, and others deviating farther from, the parent language.

The Frænc is a dialect of the Teutonic, *Tud spe*, or old German; and the Gospels of Ulphilas bear such a resemblance to the Fræncic, fragments of which are preserved in the early French historians, that some learned men have pronounced those Gospels to be part of an old Fræncic version; but others of equal respectability have refuted this opinion, both from history and comparison of the dialects. Schilter has given us large monuments of the Tudesque or old German from the seventh century, which evidently prove that the Gothic of Ulphilas is the same language. Wachter's learned Glossary of the ancient German likewise confirms this position. Mr Ihre, after hesitating whether the Gospels of Ulphilas bear most resemblance to the German or Scandinavian dialect of the Gothic, declares at last in favour of the former. The Anglo-Saxon is also known to be a venerable dialect of the Tudesque; and is so intimately connected with the Gospels, that some valuable works on this subject are wholly built upon that supposition.

The Icelandic is the oldest relic of the Scandinavian. It begins with Arius Frode in the eleventh century, and is a dialect of the German. The remains we have of it are more modern by four centuries than those of the German: they are more polished than the other. The words are shortened, not only because they are more modern than the German, but because the Icelandic was polished by a long succession of poets and historians almost equal to those of Greece and Rome. Hence the Icelandic, being a more polished language than the German, has less affinity with the parent Gothic. The Swedish is more nearly related to the Icelandic than either the Danish or Norwegian. That the Swedish is the daughter of the Gothic, is fully shown by Mr Ihre above mentioned in his *Glossarium Suio-Gothicum*. There is, therefore, no manner of doubt as to the identity of the Gothic, preserved in Ulphilas and other ancient remains, with the German and Scandinavian tongue.

The modern German, a language spoken in a far greater extent than any other of modern Europe, resembles the Gothic Gospels more than the present Danish, Norwegian, or Swedish; and has certainly more ancient *flamina*. Its likeness to the Asiatic tongues, in harshness and inflexible thickness of sound, is very apparent.

Busbequius shows, that the clowns of Crim Tarty, remains of the ancient Goths, speak a language almost German. These clowns were no doubt descendants of the ancient Goths, who remained in their native country after the others had emigrated. It is therefore apparent from the whole of this investigation,

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Modern
tongues
deduced
from the
Gothic.

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Slavonian
language

tion, that the Gothic was introduced into Europe from the East, and is probably a dialect of the language originally spoken by men.

§ 3. *Of the Slavonian Language.*

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Slavonic
language,

THERE is another language which pervades a considerable part of Europe, and this, like the Gothic, seems to have originated in the East. The language we mean is the Slavonic or rather Slavic, which prevails far and wide in the eastern parts of this division of the globe. It is spoken by the Dalmatians, by the inhabitants of the Danubian provinces, by the Poles, Bohemians, and Russians. The word *slav*, that is, "slave" (whence the French word *esclave*, and our word *slave*), signifies "noble, illustrious;" but because, in the lower ages of the Roman empire, vast multitudes of these people were spread over all Europe in the quality of slaves, that word came to denote the servile tribe by way of distinction, in the same manner as the words *Geta*, *Dacæ*, and *Syræ*, did among the Greeks at a more early period.

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Spoken by
the Slavi
one of the
tribes of the
Sarmatians,

The Slavi dwelt originally on the banks of the Borysthenes, now the Dnieper or Neper. They were one of the tribes of the European Sarmatians who in ancient times inhabited an immense tract of country, bounded on the west by the Vistula, now the Weisell; on the south east by the Euxine Sea, the Bosphorus Cimærus, the Palus Mæotis, and the Tanais or Don, which divides Europe from Asia.

In this vast tract of country, which at present comprehends Poland, Russia, and a great part of Tartary, there dwelt in ancient times many considerable tribes. To enumerate these, we believe, would not much edify our readers: we shall only inform them, that among these Sarmatian clans were the Roxolani, now the Russians, and likewise the Slavi, who dwelt near the Borysthenes, as was observed above.

The Slavi gradually advanced towards the Danube; and in the reign of Justinian having passed that river, they made themselves masters of that part of Illyricum which lies between the Drave and the Save, and is to this day from them called *Slavonia*. These barbarians by degrees over-ran Dalmatia, Liburnia, the western parts of Macedonia, Epirus; and on the east they extended their quarters all along to the western bank of the Danube, where that river falls into the Euxine. In all these countries, the Slavonian was deeply impregnated with the Greek, which was a thing of course, since the barbarian invaders settled in these regions, and mingled with the aborigines, who spoke a corrupt dialect of that language.

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The Poles,

The Poles are the genuine descendants of the ancient Sarmatæ (c), and consequently speak a dialect of their language, but much adulterated with Latin words, in consequence of the attachment the Poles have long professed to the Roman tongue.

223
Silesians,
and

The Silesians and Bohemians have corrupted their dialects in the very same manner. In those countries, then, we are not to search for the genuine remains of the ancient Sarmatian.

The modern Russians, formerly the Rhoxani or Roxolani, are the posterity of the Sarmatæ, and are a branch of the Slavi: they inhabit a part of the country which that people possessed before they fell into the Roman provinces; they speak the same language, and wear the very same dress; for, on the historic pillar at Constantinople, the Slavonians are dressed like the Russian boor. If then the Slavi are Sarmatæ, the Russians must of course be the descendants of the same people. They were long a sequestered people, and consequently altogether unconnected with the other nations of Europe. They were strangers to commerce, inhospitable to strangers, tenacious of ancient usages, averse to improvements of every kind, wonderfully proud of their imaginary importance; and, in a word, a race of people just one degree above absolute savagism. A people of this character are, for the most part, enemies to innovations; and if we may believe the Russian historians, no nation was ever more averse to innovations than the one in question. From the ninth century, at which era they embraced Christianity, it does not appear that they moved one step forward towards civilization, till Peter the Great, not a century ago, in consequence of his despotic authority, compelled them to adopt the manners and customs of their more polished neighbours.

We may then conclude, that the Russians made as little change in their language during that period, as they did in their dress, habits, and manner of living. Whatever language they spoke in the ninth century, the same they employed at the beginning of the 18th. They were, indeed, according to *Appian de bel. Mithrid.* once conquered by Diophantus, one of Mithridates's generals; but that conquest was for a moment only: they were likewise invaded, and their country over-run, by the great Timor or Tamerlane; but this invasion was like a torrent from the mountains, which spreads devastation far and wide while it rages, but makes little alteration on the face of the country.

We find likewise, that upon some occasions they made incursions upon the frontiers of the Roman empire; but we hear of no permanent settlements formed by them in these quarters. Upon the whole, we take the Russians to have been, with respect to their language, in the very same predicament with the Highlanders and Islanders of Scotland, who, according to the general opinion, have preserved the Celtic dialect pure and entire, in consequence of their having never mingled with foreigners.

From this deduction we may infer two things; first, that the Russian language is the genuine Slavonian; and, secondly, that the latter is the same, or nearly the same, with the ancient Sarmatian.

In the Russian, there are found a great number of words resembling the old simple roots of the Greek both in sound and signification; its grammatical genius is nearly the same: and we are informed by the very best authority, that there is in this language a translation of Epictetus, in which there are whole pages, in both original and translation, without one

(c) This appears by their character, their laws, their manners, their form of government, their military discipline, their impetuosity, their aristocratic splendor.

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Russian
Language.

single transposition. *Monf. Laveque*, who has published a translation of a history of Russia, is so entirely convinced of the strict analogy between the ancient Greek and the modern Russian, that he is positive that the former is derived from the latter. *Monf. Freret*, a very learned French academicien, is clearly of the same opinion. We are, however, persuaded that this opinion is ill founded. We rather imagine, that those coincidences arise from the relics of the primitive language of mankind; vestiges of which, we believe, are to be found almost in every tongue now existing.

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Russian
Language.
between Rus-
sian and
oriental
words.

It is, however, we allow, uncommonly difficult to render a reason for the syntactical analogy of the two languages, without admitting the truth of the one or the other hypothesis. We have examined with some care a good number of Russian vocables, and compared them with Greek ones of the same signification. We have not, however, found such a resemblance as we think necessary to support the position advanced above. We have indeed found a very strong resemblance between the former and many oriental words, especially Hebrew, Chaldean, and old Persian, of which we could produce several instances, did the nature of our present inquiry admit such a deviation. Every body knows that the Sarmatæ were divided into two great nations, the Asiatic and European; the former extended very far eastward, behind the mountain Caucasus, the northern shore of the Euxine Sea, and so forth. These, we may believe, derived their language from the original tongue long before the Greek language existed. This, in comparison of the Hebrew, Phœnician, Egyptian, Arabian, Chaldean, &c. was but of yesterday. The Greek, most learned men are now convinced, was a late composition of many different dialects, incorporated with the jargon of the aboriginal Ionian or Greeks. The Sarmatian, on the contrary, was the tongue of a great and populous nation, civilized, in all appearance, long before the Greeks began to emerge from a state of savagism. We are, therefore, by no means disposed to allow, either that the Greek is derived from the Russian, or the Russian from the Greek. We believe there is just the same reason for this conclusion, that the *Abbé Pezron* and *Monf. Gebelin* pretend to have discovered, in order to support their position that the Greek is derived from the Celtic. Certain it is, that the resemblance among the oriental languages, of which we take the Sarmatian to have been one, is so palpable, that any person of a moderate capacity who is perfectly master of one, will find little difficulty in acquiring any other. If, therefore, the coincidence between the Greek and Russian should actually exist, we think this circumstance will not authenticate the supposition, that either of the two is derived from the other.

In the course of this argument, our readers will be pleased to observe, that we all along suppose, that the Slavonian, of which we think the Russian is the most genuine remain, is the same with the old Sarmatian. We shall now take the liberty to hazard a conjecture with respect to the syntactical coincidence of that language with the Greek; for we acknowledge that we are not so profoundly versed in the Russian dialect of

the Slavonian as to pretend to pronounce a definitive sentence.

As the Russians were a generation of savages, there is no probability that they were acquainted with the use of letters and alphabetical writing till they acquired that art by intercourse with their neighbours. It is certain, beyond all contradiction, that few nations had made less proficiency in the fine arts than that under consideration: and we think there is little appearance of their having learned this art prior to their conversion to Christianity. Certain it is, that the Slavi, who settled in Dalmatia, Illyria, and Liburnia, had no alphabetical characters till they were furnished with them by St Jerome. The Servian character, which very nearly resembles the Greek, was invented by St Cyril; on which account the language written in that character is denominated *Chirilizza*. These Slavonic tribes knew nothing of alphabetic writing prior to the era of their conversion. The Mærian Goths were in the same condition till their Bishop Ulphilas fabricated them a set of letters.

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Origin of
the syntactical
coincidence be-
tween this
language
and the
Greek.

If the Slavi and Goths, who resided in the neighbourhood of the Greeks and Romans, had not learned alphabetical writing prior to the era of their conversion to Christianity, it must hold *à fortiori*, that the Russians, who lived at a very great distance from those nations, knew nothing of this useful art antecedent to the period of their embracing the Christian faith.

The Russians pretend that they were converted by St Andrew; but this is known to be a fable. Christianity was first introduced among them in the reign of the grand Duke Wolodimar, who marrying the daughter of the Grecian emperor Basilus, became her convert about the year 989. About this period, we imagine, they were taught the knowledge of letters by the Grecian missionaries, who were employed in teaching them the elements of the Christian doctrines. Their alphabet consists of 31 letters, with a few obsolete additional ones; and these characters resemble those of the Greeks so exactly, that there can be no doubt of their being copied from them. It is true, the shape of some has been somewhat altered, and a few barbarian ones have been intermingled. The Russian liturgy, every body knows, was copied from that of the Greeks; and the best specimen of the old Russian is the church offices for Easter, in the very words of Chrysostom, who is called by his name *Zachari*, "golden-mouthed." The power of the clergy in Russia was excessive; and no doubt their influence was proportioned to their power. The first race of clergy in that country were undoubtedly Greeks. We know how active and industrious those people were in propagating their language as well as their religion. The offices of religion might be at first written and pronounced in the Greek tongue, but it would soon be found expedient to have them translated into Russian. The persons employed in this work must have been Greeks, who understood both languages.

As it is confessedly impossible that a people so dull and uninventive as the Russians originally were, could ever have fabricated a language so artificially constructed as their present dialect; and as it is obvious, that, till Christianity was introduced among them by the Greeks, they could have no correspondence with that

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people—it must appear surprising by what means their language came to be formed so exactly according to the Greek model. We have observed above, that the Russian letters must have been invented and introduced into that country by the Greek missionaries. We think it probable, that those apostles, at the same time that they taught them a new religion, likewise introduced a change into the idiom of their language. The influence of these ghostly teachers over a nation of savages must have been almost boundless; the force of their precepts and example almost uncontrollable. If the savage converts accepted a new religion from the hands of those Grecian apostles, they might with equal submission adopt improvements in their language. Such of the natives as were admitted to the sacerdotal function must have learned the Greek language, in order to qualify them for performing the offices of their religion. A predilection for that language would be the immediate consequence. Hence the natives, who had been admitted into holy orders, would co-operate with their Grecian masters in improving the dialect of the country; which, prior to the period above mentioned, must have greatly deviated from the original standard of the Sarmatian tongue.

Upon this occasion, we imagine the Greek apostles, in conjunction with their Russian disciples, reduced the language of the country to a resemblance with the Greek idiom. They retained the radical vocabularies they found them; but by a variety of flexions, conjugations, derivations, compositions, and other modifications, transformed them into the Grecian air and apparel. They must have begun with the offices of the church; and among a nation of savages newly converted, the language of the new religion would quickly obtain a very extensive circulation. When the Grecian garniture was introduced into the church, the idiom would in process of time assume a similar dress. The fabric of the Grecian declensions, conjugations, &c. might be grafted upon Russian stocks without affecting the radical parts of the language. If the dialect in question, like most others of a very ancient date, laboured under a penury of vocabularies, this manœuvre would contribute exceedingly to supply that defect. By this expedient the Greek language itself had been enlarged from about 300 radical terms to the prodigious number of words of which it now consists.

The Latin tongue we have seen above in its original constitution differed widely from the Greek; and notwithstanding this incongruity, the improvers of the former have pressed it into a very strict agreement with the latter. This, we think, was still a more difficult task; as, in our opinion, the genius of the Latin differs in a much greater degree than that of the Russian does from the Greek. We know, that the genius of the Gothic tongue and those of all its descendants are much more in unison with the Greek than with that of the Latin. The Spanish, Italian, and French, have cudgelled many of their Gothic, Teutonic, and Celtic verbs, into a kind of conjugations, imitating or rather aping those of the Latin. The Persians have formed most elegant and energetic declensions and conjugations, upon inflexible roots, borrowed from the Pahlavi and Deri, and even from Tartar originals.

Upon the grounds above-mentioned we have taken

the liberty to hazard the following conjectures, which we cheerfully submit to the cognizance of our more enlightened readers.

1. That the Sarmatian was a dialect of the original language of mankind.
2. That the Slavonian was a dialect of the Sarmatian.
3. That the Russian is the most genuine and purified relic of the Slavonian and Sarmatian.
4. That the Russians had no alphabetical characters prior to the era of the introduction of Christianity, that is, towards the end of the tenth century.
5. That they were converted by Grecian missionaries.
6. That those missionaries copied their present letters from those of Greece; and in conjunction with the more enlightened natives, reduced the original unimproved Russian to its present resemblance to the Greek standard.

The Russian language, like most others, contains eight parts of speech, noun, pronoun, &c. Its nouns have three genders, masculine, feminine, and neuter; it has also a common gender for nouns which are both sexes. It has only two numbers, singular and plural. Its cases are seven, nominative, genitive, dative, accusative, vocative, instrumental, and prepositive. These cases are not formed by varying the termination, as in Greek and Latin; but generally by placing a vowel after the word, as, we imagine, was the original practice of the Greeks (See *Greek Section*). Thus in Russian, *рука*, "hand;" nominative, *рука* "the hand;" genitive, *руки* "of the hand," &c. See *Les Elements de la Langue Russe par Chomskoy*. Nouns substantive are reduced to four declensions, and adjectives make a fifth. These agree with their substantives in case, gender, and number. They have three degrees of comparison, as is common in other languages; the positive, comparative, and superlative. The comparative is formed from the feminine of the nominative singular of the positive, by changing *a* into *ee*, that is, *ee* in English; the superlative is made by prefixing *vee*, *pre*, before the positive. These rules are general; for the exceptions, recourse must be had to the Russian grammar above-mentioned.

The numeral adjectives in Russian have three genders like the rest, and are declined accordingly. Their pronouns have nothing peculiar, and are divided and arranged in the same manner as in other languages. Verbs in the Russian language are comprehended under two conjugations. The moods are only three; the indicative, the imperative, and the infinitive: the subjunctive is formed by placing a particle before the indicative. Its tenses are eight in number; the present, the imperfect, the preterite simple, the preterite compound, the pluperfect, the future indeterminate, the future simple, the future compound. The verbs have their numbers and persons as in other languages. To enter into a detail of their manner of conjugating their verbs would neither be consistent with our plan, nor, we are persuaded, of much consequence to our readers. Their other parts of speech differ nothing from those of other languages. Their syntax nearly resembles that of the Greek and Latin. All these articles must be learned from a grammar of the language. Whether there is any grammar of the Russian language com-
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nouns

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A Declension

Verbs

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on page 562.

set in English we know not. That of Mons. Charpentier in French, printed at Petersburg in 1778, is the only one we have seen, and which appears to us a very excellent one. We could wish to be able to gratify our readers with a more authentic account of the origin of the Slavonian language; but this we find impossible, in consequence of the want of memoirs relating to the state of the ancient Sarmatæ. Towards the era of the subversion of the western empire, the nations who inhabited the countries in question were so blended and confounded with each other, and with Huns and other Scythian or Tartar emigrants, that we believe the most acute antiquarian would find it impossible to investigate their respective tongues, or even their original residence or extraction. We have selected the Russe as the most genuine branch of the old Slavonian, and to this predilection we were determined by the reasons above mentioned. We are sorry that we are not so well acquainted with the form of the Russian language as to be able to compare it with those of the east; but upon such a comparison, we are persuaded that the radical materials of which it is composed would be found to have originated in the oriental regions. The word *Tsar*, for example, is probably the Phenician and Chaldean *Sar* or *Zir*, "a prince, a grandee." Diodorus Siculus calls the queen of the Massagetæ, who, according to Ctesias, cut off Cyrus's head, *Zarina*; which was not many years ago the general title of the empresses of all the Russias. Herodotus calls the same princess *Tomyris*, which is the very name of the famous Timor or Temur, the conqueror of Asia. The former seems to have been the title, and the latter the proper name, of the queen of the Massagetæ. In the old Persian or Pahlavi, the word *Gard* signifies "a city;" in Russian, *Gorad* or *Grad* intimates the very same idea: hence *Constantinople* in old Russe is called *Tsarograd* or *Tjargorad*. These are adduced as a specimen only; an able etymologist might, we believe, discover a great number.

The Slavonian language is spoken in Epirus, the western part of Macedonia, in Bosnia, Servia, Bulgaria, in part of Thrace, in Dalmatia, Croatia, in Poland, Bohemia, Russia, and Mingrelia in Asia, whence it is frequently used in the seraglio at Constantinople. Many of the great men of Turkey understand it, and frequently use it; and most of the janizaries having been stationed in garrisons in the Turkish frontiers in Europe, use it as their vulgar tongue. The Hungarians, however, and the natives of Wallachia, speak a different language: and this language bears evident signatures of the Tartarian dialect, which was the tongue of the original Huns. Upon the whole, the Slavonian is by much the most extensive language in Europe, and extends far into Asia.

SECT. X. Modern Languages.

If we call all the different dialects of the various nations that now inhabit the known earth, languages, the number is truly great; and vain would be his ambition who should attempt to learn them, though but imperfectly. We will begin with naming the principal of them: There are four, which may be called

original or mother-languages, and which seem to have given birth to all that are now spoken in Europe. These are the *Latin*, *Celtic*, *Gothic*, and *Slavonian*. It will not, however, be imagined, from the term *original* given to these languages, that we believe them to have come down to us, without any alteration, from the confusion of tongues at the building of the tower of Babel. We have repeatedly declared our opinion, that there is but one truly original language, from which all others are derivatives variously modified. The four languages just mentioned are original only as being the immediate parents of those which are now spoken in Europe.

I. From the *Latin* came,

1. The Portuguese.
2. Spanish.
3. French.
4. Italian.

From the *Celtic*,

5. The Irish, or Gaelic of the Highlands of Scotland.
6. The Welsh.
7. The Irish.
8. Basse-Bretagne.

From the *Gothic*,

9. The German.
10. The Low Saxon or Low German.
11. The Dutch.
12. The English; in which almost all the noun-substantives are German, and many of the verbs French, Latin, &c. and which is enriched with the spoils of all other languages.
13. The Danish.
14. The Norwegian.
15. Swedish.
16. Icelandic.

From the *Slavonian*,

17. The Polonese.
18. The Lithuanian.
19. Bohemian.
20. Transylvanian.
21. Moravian.
22. The modern Vandalian, as it is still spoken in Lusatia, Prussian Vandalia, &c.
23. The Croatian.
24. The Russian or Muscovite; which, as we have seen, is the purest dialect of this language.
25. The language of the Calmucs and Colchæ.
26. Thirty-two different dialects of nations who inhabit the north-eastern parts of Europe and Asia, and who are descended from the Tartars and Huns-Scythians. There are polyglott tables which contain not only the alphabets, but also the principal distinct characters of all these languages.

II. The languages at present generally spoken in Asia are,

27. The Turkish and Tartarian, with their different dialects.
28. The Persian.
29. The Georgian or Iberian.
30. The Albanian or Circassian.
31. The Armenian.

These languages are spoken by the Greek Christians in Asia, under the patriarch of Constantinople.

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32. The modern Indian.
33. The Formosan.
34. The Indo-tanic.
35. The Malabarian.
36. The Warugian.
37. The Talmulic or Damulic.
38. The modern Arabic.
39. The Tangusian.
40. The Mungalic.
41. The language of the Nizarian or Akar Nigarian.
42. The Grusinic or Grusian.
43. The Chinese.
44. The Japonese.

The Danish missionaries who go to Traquabar, print books at Hail in these languages.

We have enumerated here those Asiatic languages only of which we have some knowledge in Europe, and even alphabets, grammars, or other books that can give us information concerning them. There are doubtless other tongues and dialects in those vast regions and adjacent islands; but of these we are not able to give any account.

III. The principal languages of Africa are,

45. The modern Egyptian.
46. The Fetutic, or the language of the kingdom of Fetu.
47. The Moroccan; and,
48. The jargons of those savage nations who inhabit the desert and burning regions. The people on the coast of Barbary speak a corrupt dialect of the Arabic. To these may be added the Chilhic language, otherwise called *Tamazight*; the Negritian, and that of Guinea; the Abyssinian; and the language of the Hottentots.

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language.

IV. The languages of the American nations are but little known in Europe. Every one of these, though distant but a few days journey from each other, have their particular language or rather jargon. The languages of the Mexicans and Peruvians seem to be the most regular and polished. There is also one called *Poconchi* or *Pocomana*, that is used in the bay of Honduras and toward Guntimal, the words and rules of which are most known to us. The languages of North America are in general the Algonbic, Apalachian, Mohogic, Savanahamic, Virginic, and Mexican: and in South America, the Peruvian, Caribic, the language of Chili, the Cairic, the Tucumanian, and the languages used in Paraguay, Brasil, and Guiana.

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languages.

V. We have already said, that it would be a vain and senseless undertaking for a man of letters to attempt the study of all these languages, and to make his head an universal dictionary; but it would be still more absurd in us to attempt the analysis of them in this place: some general reflections therefore must here suffice. Among the modern languages of Europe, the French seems to merit great attention; as it is elegant and pleasing in itself; as it is become so general, that with it we may travel from one end of Europe to the other without scarce having any occasion for an interpreter; and as in it are to be found excellent works of every kind, both in verse and prose, useful and agreeable. There are, besides, grammars and dictionaries of this language which give us every information concerning it, and very able masters

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who teach it; especially such as come from those parts of France where it is spoken correctly; for with all its advantages, the French language has this inconvenience, that it is pronounced scarce anywhere purely but at Paris and on the banks of the Loire. The language of the court, of the great world, and of men of letters, is moreover very different from that of the common people; and the French tongue, in general, is subject to great alteration and novelty. What pity it is, that the style of the great Corneille, and that of Moliere, should already begin to be obsolete, and that it will be but a little time before the inimitable *chefs d'œuvres* of those men of sublime genius will be no longer seen on the stage! The most modern style of the French, moreover, does not seem to be the best. We are inclined to think, that too much conciseness, the epigrammatic point, the antithesis, the paradox, the sententious expression, &c. diminish its force; and that, by becoming more polished and refined, it loses much of its energy.

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languages.

VI. The German and Italian languages merit likewise a particular application: as does the English, perhaps above all, for its many and great excellencies (See LANGUAGE). Authors of great ability daily labour in improving them; and what language would not become excellent, were men of exalted talents to make constant use of it in their works? If we had in Iroquois books like those which we have in English, Italian, French, and German, should we not be tempted to learn that language? How glad should we be to understand the Spanish tongue, though it were only to read the Araucana of Don Alonzo D'Ercilia, Don Quixote, some dramatic pieces, and a small number of other Spanish works, in the original; or the poem of Camoens in Portuguese.

VII. The other languages of Europe have each their beauties and excellencies. But the greatest difficulty in all living languages constantly consists in the pronunciation, which it is scarce possible for any one to attain unless he be born or educated in the country where it is spoken: and this is the only article for which a master is necessary, as it cannot be learned but by teaching or by conversation: all the rest may be acquired by a good grammar and other books. In all languages whatever, the poetic style is more difficult than the prosaic: in every language we should endeavour to enrich our memories with great store of words (*copia verborum*), and to have them ready to produce on all occasions: in all languages it is difficult to extend our knowledge so far as to be able to form a critical judgment of them. All living languages are pronounced rapidly, and without dwelling on the long syllables (which the grammarians call *moram*): almost all of them have articles which distinguish the genders.

VIII. Those languages that are derived from the Latin have this further advantage, that they adopt without restraint, and without offending the ear, Latin and Greek words and expressions, and which by the aid of a new termination appear to be natives of the language. This privilege is forbidden the German, who in their best translations dare not use any foreign word, unless it be some technical term in case of great necessity.

Philomathes
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Philopœmen.

Philopœmen.

PHILOMATHES, a lover of learning or science. **PHILOMELA**, in fabulous history, was a daughter of Pandion king of Athens, and sister to Procne, who had married Tereus king of Thrace. Procne separated from Philomela, to whom she was much attached, spent her time in great melancholy till she prevailed upon her husband to go to Athens and bring her sister to Thrace. Tereus obeyed; but he had no sooner obtained Pandion's permission to conduct Philomela to Thrace, than he fell in love with her, and resolved to gratify his passion. He dismissed the guards whom the suspicions of Pandion had appointed to watch him; offered violence to Philomela; and afterwards cut out her tongue, that she might not discover his barbarity, and the indignities she had suffered. He confined her in a lonely castle; and having taken every precaution to prevent a discovery, he returned to Thrace, and told Procne that Philomela had died by the way, and that he had paid the last offices to her remains. At this sad intelligence Procne put on mourning for the loss of Philomela; but a year had scarcely elapsed before she was secretly informed that her sister was not dead. Philomela, in her captivity, desisted on a piece of tapestry her misfortunes and the brutality of Tereus, and privately conveyed it to Procne. She was going to celebrate the orgies of Bacchus when she received it, but she disguised her resentment; and as during those festivals she was permitted to rove about the country, she hastened to deliver her sister Philomela from her confinement, and concerted with her on the best measures of punishing the cruelty of Tereus. She murdered her son Itylus, then in the sixth year of his age, and served him up as food before her husband during the festival. Tereus, in the midst of his repast, called for Itylus; but Procne immediately informed him that he was then feasting on his flesh, when Philomela, by throwing on the table the head of Itylus, convinced the monarch of the cruelty of the scene. He drew his sword to punish Procne and Philomela; but as he was going to stab them to the heart, he was changed into a hoopoe, Philomela into a nightingale, Procne into a swallow, and Itylus into a pheasant. This tragedy happened at Daulis in Phœtis; but Pausanias and Strabo, who mention the whole of the story, are silent about the transformation; and the former observes, that Tereus, after this bloody repast, fled to Megara, where he laid violent hands on himself. The inhabitants of the place raised a monument to his memory, where they offered yearly sacrifices, and placed small pebbles instead of barley. It was on this monument that the birds called hoopoes were first seen; hence the fable of his metamorphosis. Procne and Philomela died through excess of grief and melancholy; and as the nightingale's and the swallow's voice is peculiarly plaintive and mournful, the poets have embellished the fable by supposing that the two unfortunate sisters were changed into birds.

PHILONIUM, in pharmacy, a kind of somniferous anodyne opiate, taking its name from Philo the inventor.

Ancient Universal History, vol. vi. **PHILOPÆMEN**, a celebrated general of the Achæan league, was born in Megalopolis, a city of Arcadia, in Peloponnesus; and from his very infancy discovered a strong inclination to the profession of

arms. He was nobly educated by Cassander of Mantinea; a man of great probity, and uncommon abilities. He was no sooner able to bear arms than he entered among the troops which the city of Megalopolis sent to make incursions into Laconia, and in these inroads never failed to give some remarkable instance of his prudence and valour. When there were no troops in the field, he used to employ his leisure time in hunting and such other manly exercises. When Cleomenes king of Sparta attacked Megalopolis, Philopœmen displayed much courage and greatness of soul. He signalized himself no less some time after, in the battle of Sellasia, where Antigonus gained a complete victory over Cleomenes. Antigonus, who had been an eye-witness of his prudent and intrepid behaviour, made very advantageous offers to gain him over to his interest; but he rejected them, having an utter aversion to a court life, which he compared to that of a slave, saying, that a courtier was but a slave of a better condition. As he could not live idle and inactive, he went to the isle of Crete, which was then engaged in war, and served there as a volunteer till he acquired a complete knowledge of the military art; for the inhabitants of that island were in those days accounted excellent warriors, being scarce ever at peace among themselves. Philopœmen, having served some years among the troops of that island, returned home, and was upon his arrival appointed general of the horse; in which command he behaved so well, that the Achæan horse, heretofore of no reputation, became in a short time famous all over Greece. He was soon after appointed general of all the Achæan forces, when he applied himself to the re-establishing of military discipline among the troops of the republic, which he found in a very low condition, and universally despised by their neighbours. Aratus, indeed, was the first that raised the Achæan state to that pitch of power and glory to which it arrived; but the success of his enterprises was not so much owing to his courage and intrepidity as to his prudence and politics. As he depended on the friendship of foreign princes, and their powerful succours, he neglected the military discipline at home; but the instant Philopœmen was created prætor, or commander in chief, he roused the courage of his countrymen, in order to put them into a condition to defend themselves without the assistance of foreign allies. With this view he made great improvements in the Achæan discipline; changing the manner of their exercise and their arms, which were both very defective. He had thus, for the space of eight months, exercised his troops every day, making them perform all the motions and evolutions, and accustoming them to manage with dexterity their arms, when news was brought him that Machanidas was advancing, at the head of a numerous army, to invade Achaia. He was glad of this opportunity to try how the troops had profited by his discipline; and accordingly, taking the field, met the enemy in the territories of Mantinea, where a battle was fought. Philopœmen, having killed Machanidas with his own hand, struck off his head, and carried it from rank to rank, to encourage his victorious Achæans, who continued the pursuit, with great slaughter, and incredible ardour, to the city of Tegea, which they entered together with the fugitives. The Lacedæmonians lost on

Philopœmen.

on this occasion above 8000 men, of which 4000 were killed on the spot, and as many taken prisoners. The loss of the Achæans was very inconsiderable, and those that fell were mostly mercenaries. This happened about the year before Christ 204.

But what most of all raised the fame and reputation of Philopœmen was his joining the powerful city of Lacedæmon to the Achæan commonwealth; by which means the Achæans came to eclipse all the other states of Greece. This memorable event happened in the year 191. In this transaction we cannot help taking notice of one circumstance; which, in our opinion, reflects greater lustre on Philopœmen than all his warlike exploits. The Lacedæmonians, overjoyed to see themselves delivered from the oppressions they had long groaned under, ordered the palace and furniture of Nabis to be sold; and the sum accruing from thence, to the amount of 120 talents, to be presented to Philopœmen, as a token of their gratitude. Deputies therefore were to be appointed, who should carry the money, and desire Philopœmen, in the name of the senate, to accept of the present. On this occasion it was that the virtue of the generous Achæan appeared in its greatest lustre; for so great was the opinion which the Spartans had of his probity and disinterestedness, that no one could be found who would take upon him to offer the present: struck with veneration, and fear of displeasing him, they all begged to be excused. At last they obliged, by a public decree, one Timolaus, who had formerly been his guest, to go to Megalopolis, where Philopœmen lived, and offer him this testimony of their regard. Timolaus, with great reluctance, set out for Megalopolis, where he was kindly received and entertained by Philopœmen. Here he had an opportunity of observing the strictness of his whole conduct, the greatness of his mind, the frugality of his life, and the regularity of his manners; which struck him with such awe, that he did not dare once to mention the present he was come to offer; inasmuch that, giving some other pretence to his journey, he returned home with the money. The Lacedæmonians sent him again; but he could no more prevail upon himself now than the first time to mention the true cause of his journey. At last, going a third time, he ventured, with the utmost reluctance, to acquaint Philopœmen with the offer he had to make in the name of the Lacedæmonians. Philopœmen heard him with great calmness; but the instant he had done speaking, he set out with him for Sparta, where, after having acknowledged his obligation to the Spartans, he advised them to lay out their money in reforming or purchasing those miscreants who divided the citizens, and set them at variance by means of their seditious discourses; to the end that, being paid for their silence, they might not occasion so many distractions in the government: "for it is much more advisable (said he) to stop an enemy's mouth than a friend's; as for me, I shall always be your friend, and you shall reap the benefit of my friendship without expence." Such was the disinterestedness of this noble Achæan!

About two years after this the city of Messene withdrew itself from the Achæan league. Philopœmen attacked them; but was wounded, taken prisoner, and poisoned by the magistrates. Thus died one of

the greatest heroes that Greece or any other country ever produced. He was no way inferior in valour, military knowledge, and virtue, to any of the boasted heroes of Rome. Had Achæa been nearer to an equality with Rome, he would have preserved his country from the yoke which the Roman republic forced it to bear. Both the Greek and Roman writers put him upon the level with Hannibal and Scipio, who were his contemporaries, and happened to die the same year. They allow him to have been not only one of the greatest commanders, but also one of the greatest statesmen of his age. To his valour and prudence Achæa owed her glory, which upon his death began to decline, there being none after him in that republic able to oppose her enemies with the like steadiness and prudence: when Philopœmen was called the last of the Greeks, as Brutus was afterwards styled the last of the Romans.

PHILOSOPHER, a person versed in philosophy; or one who makes profession of, or applies himself to, the study of nature and morality.

Philosopher's Stone, the greatest object of alchemy, is a long sought-for preparation, which, when found, is to convert all the true mercurial part of metal into pure gold, better than any that is dug out of mines or perfected by the refiner's art.

Some Greek writers in the fourth and fifth centuries speak of this art as being then known; and towards the end of the 13th century, when the learning of the East had been brought hither by the Arabians, the same pretensions began to spread through Europe. It is supposed that this art, called *alchemy*, was of Egyptian origin; and that, when the ancient Greek philosophers travelled into Egypt, they brought back some of the allegoric language of this Egyptian art, ill understood, which afterwards passed into their mythology. Alchemy was the earliest branch of chemistry, considered as a philosophical science: in the other parts of chemical knowledge, facts preceded reasoning or speculation; but alchemy was originally speculative. See TRANSMUTATION.

The alchemists supposed the general principals of metals to be chiefly two substances, which they called mercury and sulphur; they apprehended also, that the pure mercurial, sulphureous, or other principles of which they imagined gold to be composed, were contained separately in other bodies: and these principles, therefore, they endeavoured to collect, and to concoct and incorporate by long digestions; and by thus conjoining the principles of gold, if they could be so procured and conjoined, it might be expected that gold would be produced. But the alchemists pretend to a product of a higher order, called *the elixir, the medicine for metals, the uncture, the philosopher's stone*; which, by being projected on a large quantity of any of the inferior metals in fusion, should change them into fine gold; which being laid on a plate of silver, copper, or iron, and moderately heated, should sink into the metal, and change into gold all the parts to which it was applied; which, on being properly heated with pure gold, should change the gold into a substance of the same nature and virtue with itself, so as thus to be susceptible of perpetual multiplication; and which, by continued coction, should have its power more and

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Philoso-
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more exalted, so as to be able to transmute greater and greater quantities of the inferior metals, according to its different degrees of perfection.

Alchemists have attempted to arrive at the making of gold by three methods: the first by separation; for every metal yet known, it is affirmed, contains some quantity of gold; only, in most, the quantity is so little as not to defray the expence of getting it out.

The second is by maturation; for the alchemists think mercury is the basis and matter of all metals; that quicksilver purged from all heterogeneous bodies would be much heavier, denser, and simpler, than the native quicksilver; and that by subtilizing, purifying, and digesting it with much labour, and long operations, it is possible to convert it into pure gold.

This method is only for mercury. With respect to the other metals, it is ineffectual, 1. Because their matter is not pure mercury, but has other heterogeneous bodies adhering to it; and, 2. Because the digestion, whereby mercury is turned into gold, would not succeed in other metals, because they had not been long enough in the mines.

Weight is the inimitable character of gold, &c. Now mercury, they say, has always some impurities in it, and these are lighter than mercury. Could they be purged away, which they think is not impossible, mercury would be as heavy as gold; and what is as heavy as gold is gold, or at least might very easily be made gold.

The third method is by transmutation, or by turning all metals readily into pure gold, by melting them in the fire, and casting a little quantity of a certain preparation into the fused matter; upon which the feces retire, are volatilized and burnt, and carried off, and the rest of the mass is turned into pure gold. That which works this change in the metals is called the *philosopher's stone*. See TRANSMUTATION.

Whether this third method be possible or not, it is difficult to say. We have so many testimonies of it from persons who on all other occasions speak truth, that it is hard to say they are guilty of direct falsehood, even when they say that they have been masters of the secret. We are told, that it is only doing that by art which nature does in many years and ages. For as lead and gold differ but little in weight, therefore there is not much in lead beside mercury and gold. Now, if we had any body which would so agitate all the parts of lead as to burn all that is not mercury therein, and had also some sulphur to fix the mercury, would not the mass remaining be converted into gold? There is nothing in nature so heavy as lead except gold, mercury, and platina, which was not known to these reasoners; it is evident, therefore, there is something in lead that comes very near to gold. But in lead there is likewise some heterogeneous matter different both from mercury and gold. If therefore 19 ounces of lead be dissolved by the fire, and 8 ounces be destroyed by these means, it is argued that we shall have the rest good gold; the ratio of lead to gold being as 11 to 19. If then the philosopher's stone can purify the mercurial matter in lead, so as that nothing shall remain but the pure mercurial body, and you can fix and coagulate this by means of sulphur, out of 19 ounces of lead you will have 11 of gold: or, if you reduce the lead from 18 to 14, you will then have

converted it into mercury; and if you farther purify this mercury to the proper standard, you will have gold; provided you have but a sulphur with which to fix and coagulate it. Such is the foundation of the opinion of the philosopher's stone; which the alchemists contend to be a most subtil, fixed, concentrated fire, which, as soon as it melts with any metal, does, by a magnetic virtue, immediately unite itself to the mercurial body of the metal, volatilize and cleanse off all that is impure therein, and leave nothing but a mass of pure gold. Many frauds and artifices have unquestionably been practised in this operation, and there might be political reasons why princes and others should encourage those who pretended to a power of furnishing this inexhaustible source of wealth; but it would be wrong to censure as impostors all those who have declared themselves convinced, from their own experiments, of the transmutability of base metals into gold. There are strong reasons, however, to believe that the authors have been deceived themselves by fallacious appearances. Mr Boyle gives an account of a process by which he imagines part of the substance of gold to have been transmuted into silver. He also relates a very extraordinary experiment, under the title of the degradation of gold by an anti-elixir, which was published in his own life-time, and since reprinted in 1739. Hence many have been led to conclude in favour of the alchemical doctrine of the transmutability of metals. See an account of this experiment, with remarks upon it by Dr Lewis, in his *Commerce of Arts*, sect. 12. p. 297, &c.

"The opinion (says Holt) that one metallic or other foreign substance might be changed into another, was, it seems, at this time (reign of Henry VI. of England) propagated by certain chemists, whose observations on the surprising effects and alterations produced in certain substances by the force of heat carried their imaginations beyond what sound judgment might warrant. The first instance of which on record is in vol. xi. p. 68. of the *Fadera*; wherein Henry VI. grants a licence to John Cobbe, freely to work in metals; he having, by philosophical art, found out a method of transferring imperfect metals into perfect gold and silver.

"This pretended secret, known afterwards by the name of the *philosopher's stone* or *powder*, was encouraged by four licences, granted to different projectors during this reign, and at sundry times after, during this century particularly, and in succeeding times, all over Europe. The frenzy has not entirely ceased even to this day, although it meets with neither public encouragement nor countenance from men of sober reason; the projectors having yet found nothing from their airy schemes in this mode of search but certain ruin to their property."

The same author, when speaking of the commerce of the kingdom, and the wonderful increase and riches of commercial cities, speaks thus: "This is the true philosopher's stone, so much sought after in former ages, the discovery of which has been reserved to genius, when studying to improve the mechanic arts. Hence a pound of raw materials is converted into stuffs of fifty times its original value. And the metals too are not, indeed, transmuted into gold—they are more:

Philoso-
pher's
Stone.

Characters
of the Kings
and Queens
of England.

for

Philosophic.

for the labour of man has been able to work the baser metal, by the ingenuity of art, so as to become worth more than many times its weight in gold."

PHILOSOPHIC, or PHILOSOPHICAL, something belonging to PHILOSOPHY.

PHILOSOPHICAL EGG, among chemists, a thin glass body or bubble, of the shape of an egg, with a long neck or stem, used in digestions.

PHILOSOPHIZING, rules of. See NEWTONIAN *Philosophy*, n° 16. and the following article.

Philosophical, Philosophizing.

PHILOSOPHY,

Definitions of philosophy.

IS a word derived from the Greek, and literally signifies the *love of wisdom* (Δ). In its usual acceptation, however, it denotes a science, or collection of sciences, of which the universe is the object; and of the term thus employed many definitions have been given, differing from one another according to the different views of their several authors. By Pythagoras, philosophy is defined *πιστῆς καὶ λόγου*, "the knowledge of things existing;" by Cicero, after Plato, *scientia rerum divinarum et humanarum cum causis*; and by the illustrious Bacon, *interpretatio naturæ*. Whether any of these definitions be sufficiently precise, and at the same time sufficiently comprehensive, may be questioned; but if philosophy in its utmost extent be capable of being adequately defined, it is not here that the definition should be given. "Explanation (says an acute-writer *), is the first office of a teacher; definition, if it be good, is the last of the inquirer after truth; but explanation is one thing, and definition quite another." It may be proper, however, to observe, that the definition given by Cicero is better than that of Pythagoras, because the chief object of the philosopher is to ascertain the *causes* of things; and in this consists the difference between his studies and those of the natural historian, who merely enumerates phenomena, and arranges them into separate classes.

* Tatbam's Chart and Scale of Truth, v. i. p. 8.

2 Its object.

The principal objects of philosophy are, God, nature, and man. That part of it which treats of God is called *theology*; that which treats of nature, *physics* and *metaphysics*; and that which treats of man, *logic* and *ethics*. That these are not separate and independent sciences, but, as Bacon expresses it (B), branches from the same trunk, we shall endeavour to show, after we have given, agreeably to our usual plan, a short history of philosophy from the earliest ages to the present day.

To attempt to assign an *origin* to philosophy, would

be ridiculous; for every man endeavours to ascertain the causes of those changes which he observes in nature; and even children themselves are inquisitive after that which produces the sound of their drums and their rattles. Children, therefore, and the most illiterate vulgar, have in all ages been philosophers. But the first people among whom philosophy was cultivated as a profession, was probably the Chaldeans. We certainly read of none earlier; for though we have more authentic accounts of the Hebrews than of any other nation of remote antiquity, and have reason to believe that no people was civilized before them, yet the peculiar circumstances in which they were placed, rendered all philosophical investigation to them useless, and even tended to suppress the very spirit of enquiry. The Egyptians indeed pretended to be the first of nations, and to have spread the blessings of religion and the light of science among every other people; but, from the earliest records now extant, there is reason to believe that the Chaldeans were a civilized and powerful nation before the Egyptian monarchy was founded.

History of Philosophy.

Of the Chaldean philosophy much has been said, but very little is known. Astronomy seems to have been their favourite study; and at the era of Alexander's conquest of their country, they boasted that their ancestors had continued their astronomical observations through a period of 470,000 years. Extravagant claims to antiquity have been common in all nations (C). Callisthenes, who attended the Macedonian conqueror, was requested by Aristotle to inform himself concerning the origin of science in Chaldea; and upon examining into the grounds of this report, he found that their observations reached no farther backwards than 1903 years, or 2234 years before the Christian era. Even this is a remoter antiquity than Ptolemy allows to their science; for he mentions no Chaldean observations prior to the era of Nabonassar, or

3 Philosophy of the Chaldeans.

(A) The origin usually attributed to the term *philosophy* has been already assigned in the article *PHILOLOGY*. M. Chauvin gives it a turn somewhat different. According to him, the term is derived from *philos*, *desire* or *study*, and *sophia*, *wisdom*; and therefore he undertakes the word to mean *the desire or study of wisdom*; for (says he) Pythagoras, conceiving that the application of the human mind ought rather to be called *study* than *science*, set aside the appellation of *wisdom* as too assuming, and took that of *philosopher*.

(B) Convenit igitur parti *philosophiam* in doctrinas tres; *doctrinam de nominibus*, *doctrinam de naturis*, *doctrinam de homine*. Quoniam autem partitiones *scientiarum* non sunt lineis diversis finibus, quæ coeunt ad unum angulum; sed potius ramis arborum, qui conjunguntur in uno trunco, qui etiam truncus ad spatium nonnullum integer est et continuus, antequam se partiat in ramos. *De aug. Scient. lib. iii. cap. 1.*

(C) This claim of the Babylonians is thus rejected with contempt by Cicero; "Contemnamus Babylonios, et eos, qui e Caucaſo cœli signa ſervantes, numeris, et motibus, ſtellarum curſus perfequantur: Condemnemus, inquam, hos aut *ſuſtititæ*, aut *vanitatæ*, aut *imprudentiæ*, qui 470 milia annorum, ut ipſi dicunt, monumentis comprehenſa continent, et mentiri judicemus, nec ſecundum reliquorum *judiciorum*, quod de ipſis futurum ſit, *pertimeſcere*. *De Divinatione, lib. i. § 19.*

History of
Philosophy.

§ Apud
Laert. lib. i.
§ 8.

§ Sext.
Emp. ad
Arith.
lib. i. § 2
Strabo,
lib. i. c. 2.
Cic. de Div.
lib. i. §. 1.

• Enfield's
Hist. Phil.
v. i.

4
Indian phi-
losophy

or 747 years before Christ. That they cultivated something which they called philosophy at a much earlier period than this, cannot be questioned; for Aristotle §, on the credit of the most ancient records, speaks of the Chaldean magi as prior to the Egyptian priests, who were certainly men of learning before the time of Moses. For any other science than that of the stars, we do not read that the Chaldeans were famous; and this seems to have been cultivated by them merely as the foundation of judicial astrology. Persuading the multitude that all human affairs are influenced by the stars, and professing to be acquainted with the nature and laws of this influence, their *wise men* pretended to calculate nativities, and to predict good and bad fortune ||. This was the source of idolatry and various superstitions; and whilst the Chaldeans were given up to such dotages, true science could not be much indebted to their labours. If any credit be due to Plutarch and Vitruvius, who quote Berosus, (see Berosus), it was the opinion of the Chaldean *wise men* that an eclipse of the moon happens when that part of its body which is destitute of fire is turned towards the earth. "Their cosmogony, as given by Berosus, and preserved by Syncellus, seems to be this, that all things in the beginning consisted of darkness and water; that a divine power dividing this humil mass, formed the world; and that the human mind is an emanation from the Divine nature *.

The large tract of country which comprehended the empires of Assyria and Chaldea, was the first peopled region on earth. From that country, therefore, the rudiments of science must have been propagated in every direction through the rest of the world; but what particular people made the earliest figure, after the Chaldeans, in the history of philosophy, cannot be certainly known. The claim of the Egyptians is probably best founded; but as their science was the immediate source of that of the Greeks, we shall defer what we have to say of it on account of the connection between the parent and the offspring, and turn our attention from Chaldean to Indian philosophy, as it has been cultivated from a very early period by the Brachmans and Gymnosophists. We pass over Persia, because we know not of any science peculiar to that kingdom, except the doctrines of the magi, which were religious rather than philosophical; and of them the reader will find some account under the words MAGI, POLYTHEISM, and ZOROASTER.

From whatever quarter India received its wisdom, we are certain that its philosophers were held in high repute at a period of very remote antiquity, since they were visited by Pythagoras and other sages of ancient Greece, who travelled in pursuit of knowledge.

Yet they seem to have been in that early age, as well as at present, more distinguished for the severity of their manners than for the acquisition of science; and, as Dr Enfield observes, to have more resembled modern monks than ancient philosophers. The brachmans or bramins, it is well known, are all of one tribe; and the most learned of them are in their own language called *Pundits* or *Pandits*. The Greek writers, however, mention a society called *Samanasans*, who, voluntarily devoting themselves to the study of divine wisdom, gave up all private property, committed their children to the care of the state, and their wives to the protection of their relations. This society was supported at the public expence; and its members spent their time in contemplation, in conversation on divine subjects, or in acts of religion.

The philosophy of the Indians has indeed from the beginning been engrafted on their religious dogmas, and seems to be a compound of fanatic metaphysics and extravagant superstition, without the smallest seasoning of rational physics. Very unlike the philosophers of modern Europe, of whom a great part labour to exclude the agency of mind from the universe, the Pandits of Hindostan allow no powers whatever to matter, but introduce the Supreme Being as the immediate cause of every effect, however trivial. "Brehm, the Spirit of God, (says one of their most revered Bramins), is absorbed in self-contemplation. The same is the mighty Lord, who is present in every part of space, whose omnipresence, as expressed in the Reig Beid or Rigveda, I shall now explain. Brehm is one, and to him there is no second; such is truly Brehm. His omniscience is self-inspired or self-intelligent, and its comprehension includes every possible species. To illustrate this as far as I am able; the most comprehensive of all comprehensive faculties is omniscience; and being self-inspired, it is subject to none of the accidents of mortality, conception, birth, growth, decay, or death; neither is it subject to passion or vice. To it the three distinctions of time, past, present, and future, are not. To it the three modes of being (n) are not. It is separated from the universe, and independent of all. This omniscience is named Brehm. By this omniscient Spirit the operations of God are enlivened. By this Spirit also the 24 powers (E) of nature are animated. How is this? As the eye by the sun, as the pot by the fire, as iron by the magnet (F), as variety of imitations by the mimic, as fire by the fuel, as the shadow by the man, as dust by the wind, as the arrow by the spring of the bow, and as the shade by the tree; so by this Spirit the world is endued with the powers of intellect, the powers of the will, and the powers of action: so that if

(n) To be awake, to sleep, and to be absorbed in a state of unconsciousness—a kind of trance.

(E) The 24 powers of nature, according to the Bramins, are the five elements, *fire, air, earth, water, and æther* (a kind of subtile æther); the five members of action, the *hand, foot, tongue, anus, and male-organ of generation*; the five organs of perception, the *ear, eye, nose, mouth, and skin*; the five senses, which they distinguish from the organs of sensation; the three dispositions of the mind, *desire, passion, and tranquillity*; and the power of *consciousness*.

(F) If the work from which this extract is quoted be of as great antiquity as Mr Halhed supposes, the Bramins must have been acquainted with the phenomena of magnetism at a much earlier period than any other philosophers of whom history makes mention.

History of if it emanates from the heart by the channel of the ear, it causes the perception of sounds; if it emanates from the heart by the channel of the skin, it causes the perception of touch; if it emanates from the heart by the channel of the eye, it causes the perception of visible objects; if it emanates from the heart by the channel of the tongue, it causes the perception of taste; if it emanates from the heart by the channel of the nose, it causes the perception of smell. This also invigorates the five members of action, and invigorates the five members of perception, and invigorates the five elements, and invigorates the five senses, and invigorates the three dispositions of the mind, &c. causes the creation or the annihilation of the universe, while itself beholds every thing as an indifferent spectator *."

Preliminary Disc. Halhed's Intro. 6 admits not a separate existence of matter, and

From this passage it is plain that all the motions in the universe, and all the perceptions of man, are, according to the Bramins, caused by the immediate agency of the Spirit of God, which seems to be here considered as the soul of the world. But it appears from some papers in the Asiatic Researches, that the most profound of these oriental philosophers, and even the authors of their sacred books, believe not in the existence of matter as a separate substance, but hold an opinion respecting it very similar to that of the celebrated Berkeley. The Védantis (says Sir William Jones), unable to form a distinct idea of brute matter independent of mind, or to conceive that the work of Supreme Goodness was left a moment to itself, imagine that the Deity is ever present to his work, and constantly supports a series of perceptions, which in one sense they call *illusory*, though they cannot but admit the reality of all created forms, as far as the happiness of creatures can be affected by them.

This is the very immaterialism of Berkeley; and in proof that it is the genuine doctrine of the Bramins, the learned president quotes the *Bhāgavat*, which is believed to have been pronounced by the Supreme Being, and in which is the following sentence:

"Except the *first cause*, whatever may appear, and may not appear, in the mind, know that to be the mind's *Māyā*, or "delusion," as light, as darkness."

7 reaches the metaphysical. We have shown elsewhere (see METAPHYSICS, n° 269.) that the metaphysical doctrines of the Bramins, respecting the human soul, differ not from those of Pythagoras and Plato; and that they believe it to be an emanation from the great soul of the world, which, after many transmigrations, will be finally absorbed in its parent substance. In proof of their believing in the metempsychosis, Mr Halhed gives us the following translation of what (he says) is a beautiful stanza in the Gēētā: "As throwing aside his old clothes, a man puts on others that are new; so our lives, quitting the old, go to other newer animals."

8 physics of the Bra-ns.

From the Bramins believing in the soul of the world not only as the *sole agent*, but as the *immediate cause* of every motion in nature, we can hardly suppose them to have made any great progress in that science which in Europe is cultivated under the name of *physics*. They have no inducement to investigate the laws of nature; because, according to the first principles of their philosophy, which, together with their religion, they believe to have been revealed from heaven, every phenomenon, however regular, or however anomalous,

is produced by the voluntary act of an intelligent mind. Yet if they were acquainted with the use of fire-arms 4000 years ago, as Mr Halhed seems to believe, he who made that discovery must have had a very considerable knowledge of the powers of nature; for though gunpowder may have been discovered by accident in the East, as it certainly was in the West many ages afterwards, it is difficult to conceive how mere accident could have led any man to the invention of a gun. In astronomy, geometry, and chronology too, they appear to have made some proficiency at a very early period. (See ASTRONOMY, n° 4.) Their chronology and astronomy are indeed full of those extravagant fictions which seem to be essential to all their systems; but their calculation of eclipses, and their computations of time, are conducted upon scientific principles.

"It is sufficiently known (says Mr Davis †) that the Hindoo division of the ecliptic into signs, degrees, &c. is the same as ours; that their astronomical year is sidereal, or containing that space of time in which the sun, departing from a star, returns to the same; that it commences on the instant of his entering the sign Aries, or rather the Hindoo constellation Mésha; that each astronomical month contains as many even days and fractional parts as he stays in each sign; and that the civil differs from the astronomical account of time only in rejecting those fractions, and beginning the year and month at sunrise, instead of the intermediate instant of the artificial day or night. Hence arises the unequal portion of time assigned to each month dependent on the situation of the sun's apsis, and the distance of the vernal equinoctial colure from the beginning of Mésha in the Hindoo sphere; and by these means they avoid those errors which Europeans, from a different method of adjusting their calendar by intercalary days, have been subject to."

Mr Davis observes, that an explanation of these matters would have led him beyond his purpose, which was only to give a general account of the method by which the Hindoos compute eclipses, and to show that the science of astronomy is as well known among them now as ever it was among their ancestors. This he does very completely; but in the present short historical sketch, we can neither copy nor abridge his memoir. Suffice it to say, that he has shown the practical part of the Hindoo astronomy to be founded on mathematical principles; and that the learned Pandits appear to have truer notions of the form of the earth, and the economy of the universe, than those which are ascribed to their countrymen in general.

The same writer shows likewise, that the prodigious duration which the Hindoos attribute to the world, is the result of a scientific calculation, founded indeed on very whimsical principles. "It has been common with astronomers to fix on some epoch, from which, as from a radix, to compute the planetary motions; and the ancient Hindoos chose that point of time counted back, when, according to their motions as they had determined them, they must have been in conjunction in the beginning of Mésha or Aries, and coeval with which circumstance they supposed the creation. This, as it concerned the planets only, would have produced a moderate term of years compared with the enormous antiquity that will be hereafter stated."

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Philosophy.

stated: but having discovered a slow motion of the nodes and apses also, and taken it into the computation, they found it would require a length of time corresponding with 1955884890 years now expired, when they were so situated, and 2364115110 years more before they would return to the same situation again, forming together the grand anomalistick period denominated a *Calpa*, and fancifully assigned as the day of Brahmā."

But though the mathematical part of the astronomy of the Pandits is undoubtedly respectable, their physical notions of the universe are in the highest degree ridiculous and extravagant. In the Vedas and Puranas, writings of which no devout Hindoo can dispute the divine authority, eclipses are said to be occasioned by the intervention of the monster *Rahu*; and the earth to be supported by a series of animals. "They suppose (says Mr Halhed) that there are 14 spheres, seven below and six above the earth. The seven inferior worlds are said to be altogether inhabited by an infinite variety of serpents, described in every monstrous figure that the imagination can suggest. The first sphere above the earth is the immediate vault of the visible heavens, in which the sun, moon, and stars, are placed. The second is the first paradise, and general receptacle of those who merit a removal from the lower earth. The third and fourth are inhabited by the souls of those men who, by the practice of virtue and dint of prayer, have acquired an extraordinary degree of sanctity. The fifth is the reward of those who have all their lives performed some wonderful act of penance and mortification, or who have died martyrs for their religion. The highest sphere is the residence of Brahma and his particular favourites, such as those men who have never uttered a falsehood during their whole lives, and those women who have voluntarily burned themselves with their husbands. All these are absorbed in the divine essence."

11
Ethics of
the Hin-
doos.

On ethics, the Hindoos have nothing that can be called philosophy. Their duties, moral, civil, and religious, are all laid down in their *Vedas* and *Shasters*; and enjoined by what they believe to be divine authority, which supercedes all reasoning concerning their fitness or utility. The business of their Pandits is to interpret those books, which are extremely ancient, and written in a language that has long been unintelligible to every other order of men; but no Pandit will alter the text, however impossible to be reconciled to principles established in his own practice of astronomy. On such occasions, the usual apology for their sacred books is, that "such things may have been so formerly, and may be so still; but that for astronomical purposes, astronomical rules must be followed." The great duties of morality have been prescribed in every religious code; and they are not overlooked in that of the Hindoos, though the highest merit that a Bramin can have consists in voluntary acts of abstinence and mortification, and in contempt of death.

* *Doct's*
Memoir,
Astic Re-
searches,
vol. ii.

12
Philosophy
of the Ara-
bians and
Chinese.

Of the ancient philosophy of the Arabians and Chinese nothing certain can be said; and the narrow limits of such an abstract as this, do not admit of our mentioning the conjectures of the learned, which contradict each other, and are all equally groundless.

There is indeed sufficient evidence that both nations were at a very early period observers of the stars; and

that the Chinese had even a theory by which they foretold eclipses (see ASTRONOMY, n° 2, 3.); but there is reason to believe that the Arabians, like other people in their circumstances, were nothing more than judicial astrologers, who possessed not the smallest portion of astronomical science.

Pliny makes mention of their magi, whilst later writers tell us, that they were famous for their ingenuity in solving enigmatical questions, and for their skill in the arts of divination: but the authors of Greece are silent concerning their philosophy; and there is not an Arabian book of greater antiquity than the Koran extant. (See PHILOLOGY, Section II.)

Leaving therefore regions so barren of information, let us pass to the Phœnicians, whose commercial celebrity has induced many learned men to allow them great credit for early science. If it be true, as seems highly probable, that the ships of this nation had doubled the Cape and almost encompassed the peninsula of Africa long before the era of Solomon (See OPHIR, n° 10), we cannot doubt but that the Phœnicians had made great proficiency in the art of navigation, and in the science of astronomy, at a period of very remote antiquity. Nor were these the only sciences cultivated by that ancient people: the learned Cudworth has, in our opinion, sufficiently proved that *Mojibuc* or *Mochus* a Phœnician, who, according to Strabo, flourished before the Trojan war, was the author of the atomic philosophy afterwards adopted by Leucippus, Democritus, and others among the Greeks; and that it was with some of the successors of this sage that Pythagoras, as Jamblichus tells us, conversed at Sidon, and from them received his doctrine of *Monads* (See PYTHAGORAS). Another proof of the early progress of the Phœnicians in philosophy may be found in the fragments of their historian Sanchoniatho which have been preserved by Eusebius†. We are indeed aware that men of great celebrity have called in question the authenticity of those fragments, and even the very existence of such a writer as Sanchoniatho; but for this scepticism we can discover no foundation (See SANCHONIATHO). His history may have been interpolated in some places by the translator Philo-Byblius; but Porphyry, Eusebius, and Theodoret, speak of it as a work of undoubted credit, and affirm that its author flourished before the Trojan war. Now this ancient writer teaches that, according to the *wise men* of his country, all things arose at first from the necessary agency of an active principle upon a passive chaotic mass which he calls *mal*. This chaos Cudworth thinks was the same with the elementary *water* of Thales, who was also of Phœnician extraction; but Mosheim justly observes that it was rather *dark air*, since Philo translates it *νεφελωδον*. Be this as it may, nothing can be more evident than that the Phœnicians must have made some progress in what must surely be considered as philosophy, however false, so early as the era of Sanchoniatho; for speculations about the origin of the world never occur to untaught barbarians. Besides Mochus and Sanchoniatho, Cadmus, who introduced letters into Greece, may undoubtedly be reckoned among the Phœnician philosophers; for though it is not pretended that the alphabet was of his invention, and

13
Early
science of
the Phœni-
cians.

† *Prep. Ev.*

History of though it is by no means certain that the Greeks, at the time of his arrival among them, were wholly destitute of alphabetic characters (See PHILOLOGY, n° 130.); yet the man who could prevail with illiterate savages to adopt the use of strange characters, must have been a great master of the science of human nature. Several other Phœnician philosophers are mentioned by Strabo; but as they flourished at a latter period, and philosophised after the systematic mode of the Greeks, they fall not properly under our notice. We pass on therefore to the philosophy of Egypt.

14 Egyptian It has been already observed that the Egyptians boasted of being the first of nations, and the authors of all the science which in separate rays illuminated the rest of the world. But though this claim was undoubtedly ill-founded, their high antiquity and early progress in the arts of civil life cannot be controverted. The Greeks with one voice confess that all their learning and wisdom came from Egypt, either imported immediately by their own philosophers, or brought through Phœnicia by the sages of the east; and we know from higher authority than the histories of Greece, that at a period so remote as the birth of Moses, the wisdom of the Egyptians was proverbially famous. Yet the history of Egyptian learning and philosophy, though men of the first eminence both ancient and modern have bestowed much pains in attempts to elucidate it, still remains involved in clouds of uncertainty. That they had some knowledge of physiology, arithmetic, geometry, and astronomy, are facts which cannot be questioned; but there is reason to believe that even these sciences were in Egypt pushed no farther than to the uses of life. That they believed in the existence of incorporeal substances is certain; because Herodotus assures us that they were the first asserters of the immortality, pre-existence, and transmigration of human souls, which they could not have been holding those souls to be at least *incorporeal*, it not *immaterial*.

The author of Egyptian learning is generally acknowledged to have been *Thoth*, *Theut*, or *Taaut*, called by the Greeks *Hermes*, and by the Romans *Mercury*; but of this personage very little is known. Diodorus Siculus says that he was chief minister to Osiris, and that he improved language, invented letters, instituted religious rites, and taught astronomy, music, and other arts. The same thing is affirmed by *Sanchoniatho*, whose antiquity has been already mentioned; by *Manetho* an Egyptian priest, who flourished during the reign of Ptolemy Philadelphus; and by Plato, whose authority, as he resided long in Egypt, and was himself an eminent philosopher, is perhaps more to be depended upon than that of the other two. In the *Philebus* we are told that *Thoth* was the inventor of letters; and lest we should suppose that by those letters nothing more is meant than picture writing or symbolical hieroglyphics, it is added, that he

distinguished between vowels and consonants, determining the number of each. The same philosopher, in his *Phædrus*, attributes to *Thoth* the invention of arithmetic, geometry, astronomy, and hieroglyphic learning; and subjoins a dissertation said to have been held between him and *Thamus* then king of Egypt, concerning the advantage and disadvantage of his newly invented letters. *Thoth* boasted that the invention, by aiding memory, would greatly contribute to the progress of science; whilst the monarch contended, that it would enervate mens natural faculties by making them trust to written characters without exerting the powers of their own minds.

All this, if real, must have happened before the era of Moses; and since it is almost certain that alphabetical characters were in use prior to the *exod* of the Israelites from Egypt (See PHILOLOGY, n° 24, 25.) we may as well allow the invention to *Thoth*, as give it to an earlier author of unknown name. That arithmetic, geometry, and astronomy, were cultivated in Egypt from the most remote antiquity, is affirmed by all the ancients, and made in the highest degree probable by the situation of the country. The first elements of astronomy have certainly been discovered by various nations, whose habits of life led them to the frequent observation of the heavens; and it is observed by Cicero, that the Egyptians and Babylonians, dwelling in open plains where nothing intercepted the view of the heavenly bodies, naturally devoted themselves to the study of that science. The annual overflowing of the Nile, which broke up the boundaries of their lands, would lay the Egyptians under the necessity of adopting some method of settling those boundaries anew; and necessity we know to be the parent of invention. Hence their early acquaintance with practical geometry cannot well be doubted. Their custom of embalming their dead, and the perfection to which they carried that art (c), shows infallibly their knowledge of the properties of natural substances, and gives some reason to believe that they were not altogether strangers to anatomy: but if we allow them to have been at this early period anatomists acquainted with the powers of drugs, we can hardly refuse them some skill in the art of physic, which they themselves traced up to their gods and demigods, to *Scrapis*, *Isis*, and her son *Horus* or *Apollo*.

The art of alchymy has been said to have been known by the ancient Egyptians; and from the author of the Egyptian philosophy it has been called the *Hermetic art*. But though this is unquestionably a fiction, there is evidence that they were possessed of one art which is even yet a *desideratum* in the practice of chemistry. "Moses (we are told*) took the golden calf, which his brother had made for idolatrous purposes, and burnt it in the fire, and ground it to powder, and srowed it on the water, and made the children of Israel drink of it." Had this fact been related by Herodotus or Diodorus Siculus, it would

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* Fred.
xxii. 20.

(c) It is true that the dissection of some mummies has lessened the high opinion long entertained of the skill of the ancient Egyptians in the art of embalming; yet it must be granted that their knowledge of antiseptic drugs was great, since it is now certainly known even from these dissections, that by means of such drugs they contrived to preserve rags of cloth from corruption for upwards of 3000 years.

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have been deemed sufficient evidence that the Egyptians were even at that early period no strangers to the art of chemistry: and surely the evidence should not be the worse for coming from the pen of the Hebrew lawgiver, who was himself educated in the court of Egypt.

95
Not carried
to high per-
fection.

But though it is thus evident that the rudiments of almost every useful science were known in Egypt from the remotest antiquity, it does not appear that any of them was carried to a great degree of perfection, unless perhaps chemistry alone must be excepted. One would think that no science could have been more indispensably requisite to them than geometry. And yet though Pythagoras is said to have spent 22 years in Egypt studying that science and astronomy, he himself discovered (H) the famous 47th Prop. of Euclid's first book after his return to Samos. This, though a very useful, is yet a simple theorem; and since it was not reached by the Egyptian geometry, we cannot suppose that those people had then advanced far in such speculations. The same conclusion must be drawn with respect to astronomy; for Thales is said to have been the first that calculated an eclipse of the sun; and we nowhere read that the Egyptians pretended to dispute that honour with him. To this it may be replied, that Pythagoras was in Egypt undoubtedly taught the true constitution of the solar system, and what is more extraordinary, the doctrine of comets in particular, and of their revolutions, like the other planets, round the sun (I). We grant that he was taught all this; but it was not scientifically, but dogmatically, as facts which the priests had received by tradition from their early ancestors, and of which they had never questioned the truth nor enquired into the reasons. Of this we need no better proof than that the Pythagorean system of the sun was totally ne-

16
Their
knowledge
of the solar
system.

glected by the Greeks as soon as they began to frame hypotheses and to speculate in philosophy (K). History of
Philosophy

But it may seem strange, and certainly is so, that the Egyptian priests, in the days of Pythagoras, should have preserved so great a discovery of their ancestors, and at the same time have totally forgotten the principles and reasoning which led to a conclusion apparently contrary to the evidence of sense. This is a difficulty which we pretend not to remove, though the fact which involves it seems to be beyond the reach of controversy. Perhaps the following observations may throw upon it a feeble light. According to Manetho, the written monuments of the first Thoth were lost or neglected in certain civil revolutions or natural calamities which befel the kingdom of Egypt. After many ages great part of them were recovered by an ingenious interpretation of the symbols which he had inscribed upon ancient columns; and the man who made this interpretation was called the second Thoth or Hermes Trismegistus. But *thrice illustrious* as this personage was, it is at least possible that he may have been much inferior to the former Hermes, and have read his writings and transcribed his conclusions without being able to comprehend the principles or reasoning which led to those conclusions. Any man who understands Latin might translate into his own tongue the conclusions of Newton; but much more would be requisite to make him comprehend the demonstrations of his sublime geometry. By what mode of reasoning the first Hermes (L) was led to the true idea of the solar system, or whether it was by reasoning at all, cannot now be known; but it seems very evident, that when the intercourse between the Egyptians and Greeks first commenced, the wisdom of the former people consisted chiefly in the science of legislation and civil policy, and that the philo-

sopher,

(H) This discovery he claimed; and his claim was admitted by the Greek writers without having been *directly* controverted since. An excellent mathematician, however, has lately shown that the equality between the square of the hypotenuse of a right angled triangle, and the sum of the squares on the other two sides, was known to the astronomers of India at a period long prior to that of Pythagoras. Notwithstanding this, it is certainly possible that the sage of Samos may have made the discovery himself, though we think the contrary much more probable; for we agree with the able writer already mentioned, that Pythagoras, who is generally believed to have conversed with Indian brachmans as well as Egyptian priests, may have derived from them "some of the solid as well as the visionary speculations with which he delighted to instruct or amuse his disciples." See *Transactions of the Royal Society of Edinburgh*, vol. ii. Memoir xiii. Physic Class.

(I) This is recorded by Aristotle and Plutarch; and thus expressed by Ammianus Marcellinus.—"Stellas quasdam, ceteris similes, quarum ortus orbitusque, quibus sint temporibus præstituti humanis mentibus ignorari. Lib. xxv. cap. 10.

(K) *Fixas in supremis mundi partibus immotas persistere, et planetas his inferiores circa solem revolvī, terram pariter moveri cursu annuo, diurno vero circa axem propriam, et solem seu focum universi in omnium centro quiescere, antiquissima fuit philosophantium sententia. Ab Aegyptiis autem astrorum antiquissimis observationibus propagatum esse hanc sententiam verisimile est. Et etiam ab illis et a gentibus confirmata ad Græcos, gentem magis philologicam quam philosophicam, philosophia omnis antiquior juxta et senior mansisse videtur. Subinde docuerunt Anaxagoras, Democritus, et alii nonnulli, terram in centro mundi immotam stare, et astra omnia in occasum, aliqua celerius, alia tardius moveri, illque in spatiis liberrimis. Namque orbis solidi postea ab Eudoxo, Calippo, Aristotele, introducti sunt; declinante indies philosophia primitus introducta, et novis Græcorum commentis paulatim prævalentibus. Quibus vinculis antiqui planetas in spatiis liberis retineri, deque cursu rectilineo perpetuo retractas in orbem regulariter agi docere, non constat. Newton de Mundi Systemate.*

(L) Some authors, deeply skilled in the Hebrew language, have thought that the true system of the sun and planets may be perceived in the Scriptures of the Old Testament, and that it is only from the ignorance or carelessness of the translators that it does not appear in the English bible and other versions. The writer of this article confesses

History of *Philosophy* *phier, the divine, the legislator, and the poet, were all united in the same person. Their cosmogony (for all the ancients who pretended to science framed cosmogonies) differed little from that of the Phœnicians already mentioned. They held that the world was produced from chaos by the energy of an intelligent principle; and they likewise conceived that there is in nature a continual tendency towards dissolution. In Plato's Timæus, an Egyptian priest is introduced describing the destruction of the world, and asserting that it will be effected by means of water and fire. They conceived that the universe undergoes a periodical conflagration; after which all things are restored to their original form, to pass again through a similar succession of changes.*

17 *Their moral science* *Enfield's Hist. of Philosophy.* *"Of preceptive doctrine the Egyptians had two kinds, the one sacred, the other vulgar. The former, which respected the ceremonies of religion and the duties of the people, was doubtless written in the sacred books of Hermes, but was too carefully concealed to pass down to posterity. The latter consisted of maxims and rules of virtue, prudence, or policy. Diodorus Siculus relates many particulars concerning the laws, customs, and manners of the Egyptians; whence it appears that superstition mingled with and corrupted their notions of morals. It is in vain to look for accurate principles of ethics among an ignorant and superstitious people. And that the ancient Egyptians merited this character is sufficiently evident from this single circumstance, that they suffered themselves to be deceived by impostors, particularly by the professors of the fanciful art of astrology; concerning whom Sextus Empiricus justly remarks, that they have done much mischief in the world, by enslaving men to superstition, which will not suffer them to follow the dictates of right reason." See EGYPT, MYSTERIES, MYTHOLOGY, &c.*

18 *Grecian Philosophy.* *From Egypt and Phœnicia philosophy passed into Greece; where it was long taught without system, as in the countries from which it was derived. Phoroneus, Cecrops, Cadmus, and Orpheus, were among the earliest instructors of the Greeks; and they inculcated Egyptian and Phœnician doctrines in detached maxims, and enforced them, not by strength of argument, but by the authority of tradition. Their cosmogonies were wholly Phœnician or Egyptian disguised under Grecian names; and they taught a future state of rewards and punishments. The planets and the moon Orpheus conceived to be habitable worlds, and the stars to be fiery bodies like the sun; but he taught that they are all animated by divinities; an opinion which prevailed both in Egypt and the east: and it does not appear that he gave any other proof of his doctrines than a confident assertion that they were derived from some god. See ORPHEUS.*

History of Philosophy. *Hitherto we have seen philosophy in its state of infancy and childhood, consisting only of a collection of sententious maxims and traditionary opinions; but among the Greeks, an ingenious and penetrating people, it soon assumed the form of profound speculation and systematic reasoning. Two eminent philosophers arose nearly at the same period, who may be considered as the parents not only of Grecian science, but of almost all the science which was cultivated in Europe prior to the era of the great Lord Bacon: These were Thales and Pythagoras; of whom the former founded the Ionic school and the latter the Italic: from which two sprung the various sects into which the Greek philosophers were afterwards divided. A bare enumeration of these sects is all that our limits will admit of; and we shall give it in the perspicuous language and just arrangement of Dr Enfield, referring our readers for a fuller account than we can give of their respective merits to his abridged translation of Brucker's history.*

19 *The Ionic School.* *Of the IONIC SCHOOL were, 1. The Ionic sect proper, whose founder Thales had as his successors Anaximenes, Anaxagoras, Diogenes Apolloniates, and Archelaus. 2. The Socratic school, founded by Socrates, the principal of whose disciples were Xenophon, Aeschines, Simon, Cebes, Aristippus, Phædo, Euclid, Plato, Antisthenes, Critias, and Alcibiades. 3. The Cyrenaic sect, of which Aristippus was the author: his followers were, his daughter Arete, Hegesias, Anicæris, Theodorus, and Bion. 4. The Megarian or Eristic sect, formed by Euclid of Megara; to whom succeeded Eubulides, Diodorus, and Stilpo, famous for their logical subtlety. 5. The Eliac or Eretrian school, raised by Phædo of Elis, who, though he closely adhered to the doctrine of Socrates, gave name to his school. His successors were Plisitanus and Menedemus; the latter of whom, being a native of Eretria, transferred the school and name to his own country. 6. The Academic sect, of which Plato was the founder. After his death, many of his disciples deviating from his doctrine, the school was divided into the old, new, and middle academies. 7. The Peripatetic sect, founded by Aristotle, whose successors in the Lyceum were Theophrastus, Strato, Lycon, Aristotle, Critolaus, and Diodorus. Among the Peripatetics, besides those who occupied the chair, were also Diæarchus, Eudemus, and Demetrius Phalereus. 8. The Cynic sect, of which the author was Antisthenes, whom Diogenes, Onesicritus, Crates, Metrocles, Menippus, and Menedemus, succeeded. In the list of Cynic philosophers must also be reckoned Hipparchia, the wife of Crates. 9. The Stoic sect, of which Zeno was the founder. His successors in the porch were Persæus, Aristo of Chios, Herillus, Sphærus, Cleanthes, 4 D 2 Chry-*

seses that his knowledge of the Hebrew is very limited, which is probably the reason that to him the arguments of these men appear weak and their criticisms fanciful. No man, however, has a higher veneration than he for the sacred volume, which he believes to have been given for nobler purposes than to teach its readers the science of astronomy; but could the principles of that science be found in it, he should be strongly inclined to think that the first Thoth was Joseph, and that the monarch to whom he was minister was the far-famed Osiris. Were there any solid foundation for this supposition it would be easy to conceive how Thoth acquired his science, and how the Egyptian priests might retain just notions of the solar system in general, long after they had forgotten the evidence upon which he communicated those notions to their ancestors.

History of
Philosophy.The Italic
School.

Charippus, Zeno of Tarsus, Diogenes the Babylonian, Antipater, Panætius, and Posidonius.

Of the Italic School were, 1. The Italic sect proper: it was founded by Pythagoras, a disciple of Pherecydes. The followers of Pythagoras were Aristæus, Mæfarchus, Alemaon, Eephanus, Hippo, Empedocles, Epicharmus, Ocellus, Timæus, Arhythas, Hippasus, Philolaus, and Eudoxus. 2. The Eleatic sect, of which Xenophanes was the author: his successors, Parmenides, Melissus, Zeno, belonged to the metaphysical class of this sect; Leucippus, Democritus, Protagoras, Diogenes, and Anaxarchus, to the physical. 3. The Heraclitean sect, which was founded by Heraclitus, and soon afterwards expired: Zeno and Hippocrates philosophised after the manner of Heraclitus, and other philosophers borrowed freely from his system. 4. The Epicurean sect, a branch of the Eleatic, had Epicurus for its author; among whose followers were Metrodorus, Polyænus, Hermachus, Polystratus, Basilides, and Protarchus. 5. The Pyrrhonic or Sceptic sect, the parent of which was Pyrrho: his doctrine was taught by Timon the Phasian; and after some interval was continued by Ptolemy a Cyrenean, and at Alexandria by Ænesidemus.

Of the peculiar doctrines of these sects, the reader will in this work find a short account either in the lives of their respective founders, or under the names of the sects themselves. We shall only observe at present, that tho' many of them were undoubtedly absurd, and many wicked, it would yet perhaps be going too far to say with some, that the philosophy of Greece became impious under Diogenes, vicious under Epicurus, HYPOCRITICAL UNDER ZENO, impudent under Diogenes, covetous under Democritus, voluptuous under Metrodorus, fantastical under Crates, scurrilous under Menippus, licentious under Pyrrho, and quarrelsome under Cleanthes. Of the truth of this heavy charge every reader must judge for himself. We are strongly inclined to think, that there were virtues and vices peculiar to each sect; "and that the sects themselves had an affinity more or less direct with the different temperaments of man; whence the choice of sectators often depended on physical influence, or a peculiar disposition of their organs. Nothing appears more natural than that those men who were born with great force of mind and strong nerves should discover a predilection for stoicism; while mortals, endowed by nature with more delicacy of fibres and keener sensibility, fled for refuge to the myrtles of Epicurus. People whose temperaments partook of no extremes, were always inclined either to the Lyceum or the academy. Such as possessed solidity of understanding ranged themselves with Aristotle; and those who had only genius, or even pretensions to that endowment, went to augment the crowd of Platonists."

All the systematical philosophers, however, pursued their inquiries into nature by nearly the same method. Of their philosophy as well as of ours, the universe, with all that it contains, was the vast object: but the individual things which compose the universe are infinite in number and ever changing; and therefore, according to an established maxim of theirs, incapable of being the subjects of human science*. To reduce this infinitude, and to fix those fleeting beings, they established certain definite arrangements or classes, to

some of which every thing past, present, or to come, might be referred; and having ascertained, as they thought, all that could be affirmed or denied of these classes, they proved, by a very short process of syllogistic reasoning, that what is true of the class must be true of every individual comprehended under it. The most celebrated of these arrangements is that which is known by the name of *categories*; which Mr Harris thinks at least as old as the era of Pythagoras, and to the forming of which mankind would, in his opinion, be necessarily led by the following considerations: Every subject of human thought is either *substance* or *attribute*; but *substance* and *attribute* may each of them be modified under the different characters of *universal* or *particular*. Hence there arises a quadruple arrangement of things into *substance universal* and *substance particular*; into *attribute universal* and *attribute particular*: to some one of which four not only our words and ideas, but every individual of that immense multitude of things which compose the universe, may be reduced. This arrangement, however, the learned author thinks too limited; and he is of opinion, that, by attending to the substances with which they were surrounded, the Grecian schools must soon have distinguished between the attributes *essential* to all substances and those which are only *circumstantial*; between the attributes proper to *natural* substances or bodies and those which are peculiar to *intelligible* substances or minds. He likewise thinks, that the *time* and *place* of the existence of substances not present, must soon have attracted their attention; and that in considering the place of this or that substance, they could hardly avoid thinking of its *position* or *situation*. He is of opinion, that the superinduction of one substance upon another would inevitably suggest the idea of *clothing* or *habit*, and that the variety of *co-existing substances* and *attributes* would discover to them another attribute, viz. that of *relation*. Instead therefore of confining themselves to the simple division of *substance* and *attribute*, they divided *attribute* itself into nine distinct sorts, some *essential* and others *circumstantial*; and thus by setting substance at their head, made ten *comprehensive* and *universal genera*, called, with reference to their Greek name, *categories*, and with reference to their Latin name, *predicaments*. These categories are, SUBSTANCE, QUALITY, QUANTITY, RELATION, ACTION, PASSION, WHEN, WHERE, POSITION, and HABIT; which, according to the systematic philosophy of the Greeks, comprehend every human science and every subject of human thought. *History*, natural and civil, springs, says Mr Harris, out of SUBSTANCE; *mathematics* out of QUANTITY; *optics* out of QUALITY and QUANTITY; *medicine* out of the same; *astronomy* out of QUANTITY and MOTION; *music* and *mechanics* out of the same; *painting* out of QUALITY and SIZE; *ethics* out of RELATION; *chronology* out of WHEN; *geography* out of WHERE; *electricity*, *magnetism*, and *attraction*, out of ACTION and PASSION; and so in other instances.

To these categories, considered as a mere arrangement of science, we are not inclined to make many objections. The arrangement is certainly not complete: but this is a matter of comparatively small importance; for a complete arrangement of science cannot, we believe, be formed. The greatest objection to the categories arises from the use that was made of them by

History of
Philosophy.22
The categoriesPancos's
Philosophical
Dissertations, &c.21
Grecian
mode of
philosophizing.Boeth. in
Prædic. et
Anal. Ily.
sc. lib. 4.

History of
Philosophy.
23
And predi-
cables

almost every philosopher of the Grecian schools; for those sages having reduced the objects of all human science to ten general heads or general terms, instead of setting themselves to inquire by a painful induction into the nature and properties of the real objects before them, employed their time in conceiving what could be predicated of *substance* in general, of this or that *quality*, *quantity*, *relation*, &c. in the abstract: and they soon found, that of such general conceptions as the *categories* there are but five predicable or classes of *predicates* in nature. The first class is that in which the predicate is the *genus* or the *subject*; the second, that in which it is the *species* of the *subject*; the third, is when the predicate is the *specific difference* of the *subject*; the fourth, when it is a *property* of the *subject*; and the fifth, when it is something *accidental* to the *subject* (see *Logic*, Part II. chap. II. and III.) Having proceeded thus far in their system, they had nothing to do with individuals but to arrange them under their proper categories, which was commonly done in a very arbitrary manner; and then, with the formality of a syllogism, to predicate of each the predicable of the genus or species to which it belonged. But by this method of proceeding, it is obvious that no progress whatever could be made in physical, metaphysical, or ethical science; for if the individual truly belongs to the category under which it is arranged, we add nothing to our stock of knowledge by affirming or denying of it what we had before affirmed or denied of the whole genus: and if it belong not to the category under which we arrange it, our syllogising will only give the appearance of proof to what must, from the nature of things, be an absolute falsehood. It is only by experiments made on various substances apparently of the same kind that they can be certainly known to belong to the same category; and when this is done, all syllogistic reasoning from the genus to the species, and from the species to the individual, is but solemn trifling, as every proposition in this retrograde course takes for granted the thing to be proved.

24
Are no in-
struments
of science.

25
The phi-
losophy dis-
seminated
through
the whole
world;

Yet this mode of philosophizing spread from Greece almost over the whole world. It was carried by Alexander into Asia, by his successors into Egypt; and it found its way to Rome after Greece became a province of the empire. It was adopted by the Jews, by the fathers of the Christian church, by the Mohammedan Arabs during the caliphate, and continued to be cultivated by the schoolmen through all Europe, till its futility was exposed by Lord Bacon (M). The professors of this philosophy often displayed great acuteness; but their systems were built on mere hypotheses, and supported by syllogistic wrangling. Now and then indeed a superior genius, such as Alhazen and our countryman Roger Bacon, broke through the trammels of the schools, and, regardless of the authority of the Stagyrice and his *categories*, made real discoveries in physical science by experiments judiciously conducted on individual substances (see *Bacon (Roger)*; and

Optics, n° 6.) ; but the science in repute still continued to be that of *Generals*.

History of
Philosophy.

It was indeed a combination of absurd metaphysics with more absurd theology; and that which is properly called *physics*, had in Europe no place in a liberal education from the end of the eighth century to the end of the fourteenth. Towards the beginning of this period of darkness, the whole circle of instruction, or the liberal arts as they were called, consisted of two branches, the *trivium* and the *quadrivium*; of which the former comprehended *grammar*, *rhetoric*, and *dialectics*; the latter *music*, *arithmetic*, *geometry*, and *astronomy*, to which was added about the end of the eleventh century the study of a number of *metaphysical subtleties* equally useless and unintelligible.

Hitherto the works of the ancient Greek philosophers had been read only in imperfect Latin translations; and before the scholastic system was completely established. Plato and Aristotle had been alternately looked up to as the oracle in science. The rigid schoolmen, however, universally gave the preference to the Stagyrice; because his analysis of body into matter and form is peculiarly calculated to keep in countenance the most incredible doctrine of the Romish church (see *TRANSUBSTANTIATION*): and upon the revival of Greek learning, this preference was continued after the school philosophy had begun to fall into contempt, on account of much useful information contained in some of his writings on subjects of natural history, and his supposed merit as a natural philosopher. At last the intrepid spirit of Luther and his associates set the minds of men free from the tyranny of ancient names, as well in human science as in theology; and many philosophers sprang up in different countries of Europe, who professed either to be *eclectics*, or to study nature, regardless of every authority but that of reason. Of these the most eminent beyond all comparison was Francis Bacon Lord Verulam.

26
Exposed and
condemned
by Lord Bacon.

This illustrious man having read with attention the writings of the most celebrated ancients, and made himself master of the sciences which were then cultivated, soon discovered the absurdity of pretending to account for the phenomena of nature by syllogistic reasoning from hypothetical principles; and with a boldness becoming a genius of the first order, undertook to give a new chart of human knowledge. This he did in his two admirable works, intitled, 1. *De dignitate et augmentis scientiarum*; and, 2. *Novum organum scientiarum*, sive *Judicia vera de interpretatione Naturæ*. In the former of these works, he takes a very minute survey of the whole circle of human science, which he divides into three great branches, *history*, *poetry*, and *philosophy*, corresponding to the three faculties of the mind, *memory*, *imagination*, and *reason*. Each of these general heads is subdivided into numerous branches, and reflections are made upon the whole, which, though we can neither copy nor abridge them, will amply reward

(M) Scientiæ, quas habemus, sere a Græcis fluxerunt. Quæ enim scriptores Romani, aut Arabes, aut recentiores addiderunt, non multa, aut magis momenti sunt: et qualiacunque sint, fundata sunt super fundamentis quæ inventa sunt a Græcis. *Bacon*.

View of
Bacon's
Philosophy.

27
Who esta-
blishes a
better me-
thod of
inquiry.

ward the perusal of the attentive reader. The purpose of the *Nozum Organum* is to point out the proper method of interpreting nature; which the author shows can never be done by the logic which was then in fashion, but only by a painful and fair induction. "Homo naturæ minister (says he) et interpret tantum facit et intelligit, quantum de naturæ ordine re, vel mente observaverit; nec amplius scit aut potest. Syllogismus ad principia scientiarum non adhibetur, ad media axiomata frustra adhibetur, cum sit subtilitati naturæ longe in par. Assensum itaque confringit, non res. Syllogismus ex propositionibus constat, propositiones ex verbis, verba notionum tesserae sunt. Itaque si notiones ipsæ (id quod basis rei est) confusæ sint et temere a rebus abstractæ, nihil in iis quæ superstruuntur, est firmitudinis. Itaque spes est una in *inductione vera*."

To hypotheses and preconceived opinions, which he calls *idola theatri*, this great man was not less inimical than to syllogisms; and since his days almost every philosopher of eminence, except Descartes and his followers (see DESCARTES and CARTESIANS), has professed to study nature according to the method of induction so accurately laid down in the *Nozum Organum*. On this method a few improvements have perhaps been made; but notwithstanding these, Lord Bacon must undoubtedly be considered as the author of that philosophy which is now cultivated in Europe, and which will continue to be cultivated as long as men shall have more regard for matters of fact than for hypothetical opinions. Of this mode of philosophizing we shall now give a short, though we hope not inaccurate, view, by stating its objects, comparing it with that which it superseded, explaining its rules, and pointing out its uses; and from this view it will appear, that its author shares with Aristotle the empire of science.

28
View of his
Philosophy

THE universe, that unbounded object of the contemplation, the curiosity and the researches of man, may be considered in two different points of view.

In the first place, it may be considered merely as a collection of existences, related to each other by means of resemblances and distinction, situation, succession, and derivation, as making parts of a whole. In this view it is the subject of pure description.

To acquire an acquaintance with, or a knowledge of, the universe in this point of view, we must enumerate all the beings in it, mention all their sensible qualities, and mark all these relations for each. But this would be labour immense; and when done, an undistinguishable chaos. A book containing every word of a language would only give us the materials, so to speak, of this language. To make it comprehensible, it must be put into some form, which will comprehend the whole in a small compass, and enable the mind to pass easily from one word to another related to it. Of all relations among words, the most obvious are those of resemblance and derivation. An etymological dictionary, therefore, in which words are classed in consequence of their resemblances, and arranged by means of their derivative distinctions, will greatly facilitate the acquisition of the language.

Just so in nature: The objects around us may be grouped by means of their resemblance, and then ar-

ranged in those groups by means of their distinctions and other relations. In this classification we are enabled to proceed by means of our faculty of abstracting our attention from the circumstances in which things differ, and turning it to those only in which they agree. By the judicious employment of this faculty we are able not only to distribute the individuals into classes, but also to distribute those classes into others still more comprehensive, by discovering circumstances of resemblance among them: for the fewer the circumstances are which concur to form that resemblance which has engaged our attention, the greater is the number of dissimilar circumstances which are neglected; and the more extensive will be the class of individuals in which the resemblance is observed. Thus a number of individuals resembling each other in the single circumstance of life, composes the most extensive KINGDOM of ANIMALS. If it be required, that they shall further resemble in the circumstance of having feathers, a prodigious number of animals are excluded, and we form the inferior *class* of BIRDS. We exclude a great number of birds, by requiring a further similarity of web feet, and have the *order* of ANSERES. If we add *lingua citiata*, we confine the attention to the *genus* of ANATES. In this manner may the whole objects of the universe be grouped, and arranged into kingdoms, classes, orders, genera, and species.

Such a classification and arrangement is called NATURAL HISTORY; and must be considered as the only foundation of any extensive knowledge of nature. To the natural historian, therefore, the world is a collection of existences, the subject of descriptive arrangement. His aim is threefold.

1. To observe with care, and describe with accuracy, the various objects of the universe.
2. To determine and enumerate all the great classes of objects; to distribute and arrange them into all their subordinate classes, through all degrees of subordination, till he arrive at what are only accidental varieties, which are susceptible of no farther distribution; and to mark with precision the principles of this distribution and arrangement, and the characteristics of the various assemblages.
3. To determine with certainty the particular group to which any proposed INDIVIDUAL belongs.

DESCRIPTION therefore, ARRANGEMENT, and REFERENCE, constitute the whole of his employment; and in this consists all his science.

Did the universe continue unchanged, this would constitute the whole of our knowledge of nature: but we are witnesses of an uninterrupted succession of changes, and our attention is continually called to the events which are incessantly happening around us. These form a set of objects vastly more interesting to us than the former; being the sources of almost all the pleasures or pains we receive from external objects.

We are therefore much interested in the study of the events which happen around us, and strongly incited to prosecute it: but they are so numerous and so multifarious, that the study would be immense, without some contrivance for abbreviating and facilitating the task. The same help offers itself here as in the study of what may be called *quiescent nature*. Events, like existences, are susceptible of classification, in consequence of resemblances and distinction; and

View of
Bacon's
Philosophy

29
Natural
History

30
Distin-
guished
from phi-
losophy.

View of
Bacon's
Philosophy.

by attention to these, we can acquire a very extensive acquaintance with active nature. Our attention must be chiefly directed to those circumstances in which many events resemble each other, while they differ perhaps in a thousand others. Then we must attend to their most general distinctions; then to distinctions of smaller extent, and so on.

It is in this way accordingly that we have advanced in our knowledge of active nature, and are gradually, and by no means slowly, forming assemblages of events more and more extensive, and distributing these with greater and greater precision into their different classes.

In the zealous and attentive prosecution of this task a very remarkable and interesting observation occurs: In describing those circumstances of similarity among events, and particularly in distributing them according to those similarities, it is impossible for us to overlook that constancy which is observed in the changes of nature in the events which are the objects of our contemplation. Events which have once been observed to accompany each other are observed always to do so. The rising of the sun is always accompanied by the light of day, and his setting by the darkness of night. Sound argument is accompanied by conviction, impulse by motion, kindness by a feeling of gratitude, and the perception of good by desire. The unexpected experience of mankind informs us, that the events of nature go on in certain regular trains; and if sometimes exceptions seem to contradict this general affirmation, more attentive observation never fails to remove the exception. Most of the spontaneous events of nature are very complicated; and it frequently requires great attention and penetration to discover the simple event amidst a crowd of unessential circumstances which are at once exhibited to our view. But when we succeed in this discovery, we never fail to acknowledge the perfect uniformity of the event to what has been formerly observed.

31
Constancy
in the
changes of
nature

32
Universally
expected.

But this is not all: We firmly believe that this uniformity will still continue; that fire will melt wax, will burn paper, will harden clay, as we have formerly observed it to do; and whenever we have undoubted proofs that the circumstance of situation are precisely the same as in some former case, though but once observed, we expect with irresistible and unshaken confidence that the event will also be the same.

It is not surely necessary to adduce many proofs of the universality of this law of human thought. The whole language and actions of men are instances of the fact. In all languages there is a mode of construction which is used to express this relation as distinct from all others, and the conversation of the most illiterate never confounds them, except when the conceptions themselves are confounded. The general employment of the active and passive verb is regulated by it. *Turris eversa est a militibus; turris eversa est terra motu*, express two relations, and no schoolboy will confound them. The distinction therefore is perceived or felt by all who can speak grammatically. Nor is any language without general terms to express this relation, cause—effect—to occasion. Nay, it is a fact in the mind of brutes, who hourly show that they expect the same uses of every subject which they formerly made of it; and without this, animals would be incapable

of subsistence, and man incapable of all improvement. From this alone memory derives all its value; and even the constancy of natural operation would be useless if not matched or adapted to our purposes by this expectation of and confidence in that constancy.

After all the labours of ingenious men to discover the foundation of this irresistible expectation, we must be contented with saying that such is the constitution of the human mind. It is an *universal fact* in human thought; and for any thing that has been yet discovered, it is an *ultimate fact*, not included in any other still more general. We shall soon see that this is sufficient for making it the foundation of true human knowledge; all of which must in like manner be reduced to ultimate facts in human thought.

We must consider this undoubted feeling, this persuasion of the constancy of nature, as an *instinctive* anticipation of events similar to those which we have already experienced. The general analogy of nature should have disposed philosophers to acquiesce in this, however unwelcome to their vanity. In no instance of essential consequence to our safety or well being are we left to the guidance of our bounded reason; God has given us the surer conduct of natural instincts. No case is so important as this: In none do we so much stand in need of a guide which shall be powerful, infallible, and rapid in its decisions. Without it we must remain incapable of all instruction from experience, and therefore of all improvement.

Our sensations are undoubtedly feelings of our mind. But all those feelings are accompanied by an instinctive reference of them to something distinct from the feelings themselves. Hence arises our perception of external objects, and our very notions of this externity (pardon the term). In like manner, this anticipation of events, this irresistible connection of the idea of fire with the idea of burning, is also a feeling of the mind: and this feeling is by a law of human nature referred, without reasoning, to something external as its cause; and, like our sensation, it is considered as a *sign* of that external something. It is like the conviction of the truth of a mathematical proposition. This is referred by us to something existing in nature, to a necessary and eternal relation subsisting between the ideas which are the subjects of the proposition. The conviction is the sign or indication of this relation by which it is brought to our view. In precisely the same manner, the irresistible connection of ideas is interpreted as the sensation or sign of a *necessary connection* of external things or events. These are supposed to include something in their nature which renders them inseparable companions. To this bond of connection between external things we give the name of CAUSATION. All our knowledge of this relation of cause and effect, is the knowledge or conviction of consciousness of what passes in our own minds during the contemplation of the phenomena of nature. If we adhere to this view of it, and put this branch of knowledge on the same footing with those called the *abstract sciences*, considering only the *relations* of ideas, we shall acquire *demonstrative science*. If we take any other view of the matter, we shall be led into inextricable mazes of uncertainty and error.

We see then that the natural procedure of our faculty of abstraction and arrangement, in order to acquire

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Our know-
ledge of
causation.

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quire a more speedy and comprehensive knowledge of natural events, presents them to our view in another form. We not only see them as *similar* events, but as events naturally and necessarily *conjoined*. And the expression of *resemblance* among events is also an expression of *concomitancy*; and this arrangement of events in consequence of their resemblance is in fact the *discovery* of those accompaniments. The trains of natural appearance being considered as the appointments of the Author of Nature, has occasioned them to be considered also as consequences of *laws* imposed on his works by their great author, and every thing is said to be regulated by fixed laws. But this is the language of analogy. When a sovereign determines on certain trains of conduct for his subjects, he issues his orders. These orders are laws. He enforces the observance of them by his authority; and thus a certain regularity and constancy of conduct is produced. But should a stranger, ignorant of the promulgation of these laws, and of the exerted authority of the magistrate, observe this uniformity of conduct, he would ascribe it to the genius and disposition of the people; and his observation would be as useful to him for directing the tenor of his own conduct, as the knowledge of the subject himself of the real source of this constancy is for directing his.

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Laws of
nature ex-
plained.

Just so in nature, while the theologian pretends, from his discoveries concerning the existence and superintendence of God, to know that the constant accompaniment of events is the consequence of laws which the great Author and Governor of the universe has imposed on his works, the ordinary philosopher, a stranger to this scene, and to the unsearchable operations of the SUPREME MIND, must ascribe this constancy to the nature of the things. There is a great resemblance between the expression *natural law* and *grammatical rule*. Rule in strict language implies command; but in grammar it expresses merely a generality of *fact*, whether of flexion or construction. In like manner, a LAW of NATURE is to the philosopher nothing but the expression of a generality of fact. A natural or physical law is a generally observed fact; and whenever we treat any subject as a generally observed fact, we treat it physically. It is a physical law of the understanding that argument is accompanied by conviction; it is a physical law of the affection that distress is accompanied by pity; it is a physical law of the material world that impulse is accompanied by motion.

And thus we see that the arrangement of events, or the discovery of those general points of resemblance, is in fact the discovery of the laws of nature; and one of the greatest and most important is, that the laws of nature are constant.

There is no question that this view of the universe is incomparably more interesting and important than that which is taken by the natural historian; contemplating every thing that is of value to us, and, in short, the whole life and movement of the universe. This study, therefore, has been dignified with the name of PHILOSOPHY and of SCIENCE; and natural history has been considered as of importance only in so far as it was conducive to the successful prosecution of philosophy.

But the philosopher claims a superiority on another

account: he considers himself as employed in the discovery of causes, saying that philosophy is the study of the objects of the universe as related by causation, and that it is by the discovery of these relations that he communicates to the world such important knowledge. Philosophy, he says, is the science of causes. The vulgar are contented to consider the prior of two inseparably conjoined events as the cause of the other; the stroke on a bell, for instance, as the cause of sound. But it has been clearly shown by the philosopher, that between the blow on the bell and the sensation of sound there are interposed a long train of events. The blow sets the bell a trembling; this agitates the air in contact with the bell; this agitates the air immediately beyond it; and thus between the bell and the ear may be interposed a numberless series of events, and as many more between the first impression on the ear and the last impression on the nerve by which the mind is affected. He can no longer therefore follow the nomenclature of the vulgar. Which of the events of this train therefore is the cause of the sensation? None of them: It is that *something* which inseparably connects any two of them, and constitutes their bond of union. These bonds of union or causes he considers as residing in one or both of the connected objects: diversities in this respect must therefore constitute the most important distinctions between them. They are therefore with great propriety called the *qualities*, the *properties*, of these respective subjects.

As the events from which we infer the existence of these qualities of things resemble in many respects such events as are the consequences of the exertion of our own powers, these qualities are frequently denominated *POWERS*, *forces*, *energies*. Thus, in the instance just now given of the sound of a bell, we infer the powers of impulse, elasticity, nervous irritability, and animal sensibility.

In consequence of this inference of a necessary connection between the objects around us, we not only infer the posterior event from the prior, or, in common language, the effect from the cause, but we also infer the prior from the posterior, the cause from the effect. We not only expect that the presence of a magnet will be followed by certain motions in iron filings, but when we observe such motions, we infer the presence and agency of a magnet. Joy is inferred from merriment, poison from death, fire from smoke, and impulse from motion. And thus the appearances of the universe are the indications of the powers of the objects in it. Appearances are the language of nature, informing us of their causes. And as all our knowledge of the sentiments of others is derived from our confidence in their veracity; so all our knowledge of nature is derived from our confidence in the constancy of natural operations. A veracity and credulity necessarily resulting from that law of our mental constitution by which we are capable of speech, conduct us in the one case; and the constancy of nature, and the principle of induction, by which we infer general laws from particular facts, conduct us in the other. As human sentiment is inferred from language, and the existence of external things from sensation; so are the laws of nature, and the powers

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Cause

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Inferred
from ef-
fects.

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Object of
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of natural objects inferred from the phenomena. It is by the successful study of this language of nature that we derive useful knowledge. The knowledge of the influence of motives on the mind of man enables the statesman to govern kingdoms, and the knowledge of the powers of magnetism enables the mariner to pilot a ship through the pathless ocean.

Such are the lofty pretensions of philosophy. It is to be wished that they be well founded; for we may be persuaded that a mistake in this particular will be fatal to the advancement of knowledge. An author of great reputation † gives us an opportunity of deciding this question in the way of experiment. He says that the ancients were philosophers, employed in the discovery of causes, and that the moderns are only natural historians, contenting themselves with observing the laws of nature, but paying no attention to the causes of things. If he speaks of their *professed* aim, we apprehend that the assertion is pretty just in general. With very few exceptions indeed it may be affirmed of his favourite Aristotle, the philosopher *κατ' ἐκλογην*, and of Sir Isaac Newton. We select these two instances, both because they are set in continual opposition by this author, and because it will be allowed that they were the most eminent students of nature (for we must not yet call them philosophers) in ancient and modern times. Aristotle's professed aim, in his most celebrated writings, is the investigation of causes; and in the opinion of this author, he has been so successful that he has hardly left any employment for his successors beside that of commenting upon his works. We must on the other hand acknowledge that Newton makes no such pretensions, at least in that work which has immortalised his name, and that his professed aim is merely to investigate the *general* laws of the planetary motions, and to apply these to the explanation of particular phenomena. Nor will we say that he has left no employment for succeeding inquirers; but, on the contrary, confess that he has only begun the study, has discovered but one law, and has enabled us to explain only the phenomena comprehended in it alone. But he has not been unsuccessful; his investigation has been complete; and he has discovered beyond all possibility of contradiction a *fact* which is observed through the whole extent of the solar system; namely, that every body, nay that every particle in it, is continually deflected toward every other body; and that this deflection is, in every instance, proportional to the quantity of matter in that body toward which the deflection is directed, and to the reciprocal of the square of the distance from it. He has therefore discovered a physical law of immense extent. Nor has he been less successful in the explanation of particular phenomena. Of this there cannot be given a better instance than the explanation of the lunar motions from the theory of gravity begun by Newton "*Mathesi sua facem præterente*;" and now brought to such a degree of perfection, that if the moon's place be computed from it for any moment within the period of two thousand years back, it will not be found to differ from the place on which she was actually observed by one hundredth part of her own breadth.

*Hæcenus astronomo, numerorum frena recusat.
Qua toties animos veterum torfere soporum,
Quæque scholas hodie rauco certamine vexant,
Obvia conspiciamus, nube pellente, mathesi;
Qua superos penetrare domos, et ardua cali
Newtoni auspiciis jam dat contingere templa.*

We may now desire the champions of the science of causes to name any one cause which has really been discovered by their great master, whether in the operations of mind or of body. But they must not on this occasion adduce the investigation of any natural law in which he has sometimes succeeded. With still greater confidence may we challenge them to produce any remarkable instance of the explanation of natural phenomena either of mind or body. By explanation, we mean an account of the production, and an appreciation of all the circumstances, susceptible of a scrupulous comparison with fact, and perfectly consistent with it. It is here that the weakness of this philosopher's pretensions is most conspicuous; and his followers candidly acknowledge, that in the enquiries which proceed by experiment, we have not derived great assistance from Aristotle's philosophy. But this, say they, does not derogate from the pre-eminence of his philosophy, because he has shown that the *particular* fields of observation are to be cultivated only by means of experiment. But surely every field of *observation* is particular. There is no *abstract* object of philosophical research, the study of which shall terminate in the philosophy of universals. In every kind of inquiry, that cause alone must be supposed to act which we understand so far as to be able to appreciate its effects in particular circumstances, and compare them with fact, and see their perfect coincidence. If we have discovered causes, they are *known* as far as they are discovered. Their genuine effects are known, and therefore the phenomena which result from their agency are understood. When therefore it is acknowledged, as it must be acknowledged, that mankind have made but little advances in the knowledge of nature, notwithstanding the pretended discovery of causes by Aristotle, and the conducting clue of his philosophy, till of late years; and when it is also allowed that *now*, while we are every day making great additions to this subordinate knowledge, the causes which Aristotle has discovered are forgotten, and his philosophy is neglected; there is great room for suspecting (to say the least), that either the causes which philosophy pretends to have discovered are not real, or that Aristotle and his followers have not aimed at the discovery of causes, but only at the discovery of natural laws, and have failed in the attempt.

There seems here to be a previous question: *Is it possible to discover a philosophical cause, that something which is neither the prior nor the posterior of the two immediately adjoining events, but their bond of union, and this distinct from the union itself?* It is evident that this is an enquiry purely experimental. It is of human knowledge we speak. This must depend on the nature of the human mind. This is a matter of contingency, known to us only by experiment and observation. By observing all the feelings and operations of the mind, and classing and arranging them like any other object of science, we discover the general laws of human thought and human reasoning; and this is

*Discimus hinc tandem qua causa argentea Phæbe
Passibus haud æquis eat, et cur, subacta nulla*
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all the knowledge we can ever acquire of it, or of any thing else.

Much has been written on this subject. The most acute observation and sound judgment have been employed in the study; and we may venture to say, that considerable progress has been made in pneumatology. Many laws of human thought have been observed, and very distinctly marked; and philosophers are busily employed, some of them with considerable success, in the distribution of them into subordinate classes, so as to know their comparative extent, and to mark their distinguishing characters with a precision similar to what has been attained in botany and other parts of natural history; so that we may hope that this study will advance like others. But in all these researches, no phenomena have occurred which look like the perception or contemplation of these separate objects of thought, these philosophical causes, this power in abstracto. No philosopher has ever pretended to state such an object of the mind's observation, or attempted to group them into classes.

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In the c-
vents.

We may say at once, without entering into any detail, that those causes, those bonds of necessary union between the naturally conjoined events or objects, are not only perceived *by means* of the events alone, but are perceived solely *in* the events, and cannot be distinguished from the conjunctions themselves. They are neither the objects of separate observation, nor the productions of memory, nor inferences drawn from reflection on the laws by which the operation of our own minds are regulated; nor can they be derived from other perceptions in the way of argumentative inference. We cannot infer the paroxysm of terror from the appearance of impending destruction, nor the fall of a stone when not supported, as we infer the inconmeasurability of the diagonal and side of a square. This last is *implied* in the very conception or notion of a square; not as a consequence of its other properties, but as one of its essential attributes: and the contrary proposition is not only false, but incapable of being distinctly conceived. This is not the case with the other phenomenon, or any matter of fact. The proofs which are brought of a mathematical proposition, are not the reason of its being true, but the steps by which this truth is brought into our view; and frequently, as in the instance now given, this truth is perceived, not directly, but consequentially, by the inconceivableness of the contrary proposition.

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Mr. Hume's
theory a pe-
tition *princi-*
pri.

Mr Hume derives this irresistible expectation of events from the known effect of custom, the association of ideas. The correlated event is brought into the mind by this well known power of custom, with that vivacity of conception which constitutes belief or expectation. But without insisting on the utility of his theory of belief, it is sufficient to observe, that this explanation begs the very thing to be proved, when it ascribes to custom a *power* of any kind. It is the origin of this very power which is the subject in dispute. Besides, on the genuine principles of scepticism, this custom involves an acknowledgement of past events, of a something different from present impressions, which, in this doctrine (if doctrine it can be called), are the only certain existences in nature: and, lastly, it is known that *one* clear experience is a sufficient foundation for this unshaken confidence and

anticipation. General custom can never, on Mr Hume's principles, give superior vivacity to any particular idea.

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This certain nonentity of it as a separate object of observation, and this impossibility to derive this notion of necessary and causal connection between the events of the universe from any source, have induced two of the most acute philosophers of Europe, Mr Leibnitz and Father Malebranche, to deny that there is any such connection, and to assert that the events of the universe go on in corresponding trains, but without any causal connection, just as a well-regulated clock will keep time with the motions of the heavens without any kind of dependence on them. This harmony of events was pre-established by the Author of the Universe, in subserviency to the purposes he had in view in its formation.

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Another
hypothesis
respecting
causal con-
nection.

All those purposes which are cognisable by us, may certainly be accomplished by this perfect adjustment. But without insisting on the fantastic wildness of this ingenious whim, it is quite enough to observe, that it also is a begging of the question, because it supposes causation when it ascribes all to the agency of the Deity.

Thus have we searched every quarter, without being able to find a source from which to derive this perception of a necessary connection among the events of the universe, or of this confident expectation of the continuance of physical laws; and yet we are certain of the feeling, and of the persuasion, be its origin what it may: for we speak intelligibly on this subject, we speak familiarly of cause, effect, power, energy, necessary connection, motives and their influence, argument and conviction, reasons and persuasion, arguments and emotions, of gravity, magnetism, irritability, &c.; and we carry on conversations on these subjects with much entertainment and seeming instruction. Language is the expression of thought, and every word expresses some notion or conception of the mind; therefore it must be allowed, that we have such notions as are expressed by cause, power, energy. But it is here, as in many cases, we perceive a distinction without being able to express it by a definition; and that we do perceive the relation of causation as distinct from all others, and in particular as distinct from the relation of contiguity in time and place; or the relation of agent, action, and patient, must be concluded from the uniformity of language, which never confounds them except on purpose, and when it is perceived. But even here we shall find, that none of the terms used for expressing those powers of substance which are conceived as the causes of their characteristic phenomena, really express any thing different from the phenomena themselves. Let any person try to define the terms gravity, elasticity, sensibility, and the like, and he will find that the definition is nothing but a description of the phenomenon itself. The words are all derivatives, most of them verbal derivatives, implying action, gravitation, &c. As the general resemblances in shape, colour, &c. are expressed by the natural historian by generic terms, so the general resemblances in event are expressed by the philosopher in generic propositions, which, in the progress of cultivation, are also abbreviated into generic terms.

This abundantly explains the consistency of our language on this subject, both with itself and with the

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The perception of this connection a first principle.

the operations of nature, without however affording any argument for the truth of the assumption, that causes are the objects of philosophic research as separate existences; or that this supposed necessary connection is a *necessary truth*, whether supreme or subordinate. But since the perception of it has its foundation in the constitution of the human mind, it seems intitled to the name of a *first principle*. We are hardly allowed to doubt of this, when we consider the importance of it, and the care of nature to secure us in all things essential to our safety and well-being, from all danger, from inattention, ignorance, or indolence, by an instinct infallible in its information, and instantaneous in its decisions. "It would not be like her usual care (says Hume), if this operation of the mind, by which we infer like effects from like causes, and *vice versa*, were entrusted to the fallacious deduction of our reason, which is slow in its operations, appears not in any degree during the first years of infancy, and in every age and period of human life is extremely liable to error. It is more conformable to her *ordinary caution* (mark the acknowledgment) to secure so necessary an act of the mind by some instinct, or blind tendency, which may be infallible and rapid in all its operations, may discover itself at the first appearance of life, and may be independent of all the laboured deductions of reason. As she has taught us the use of our limbs, without giving us any knowledge of the nerves and muscles by which they are actuated; so she has implanted in us an instinct, which carries forward the thought in a course conformable to that established among external objects, though we be ignorant of the powers and forces on which this regularity depends."

Such a knowledge is quite unnecessary, and therefore causes are no more cognoscible by our intellectual powers than colours by a man born blind: nay, whoever will be at the pains to consider this matter agreeably to the received rules and maxims of logic, will find that necessary connection, or the bond of causation, can no more be the subject of philosophical discussion by man, than the ultimate nature of truth. It is precisely the same absurdity or incongruity, as to propose to examine light with a microscope. Other rational creatures may perceive them as easily as we hear sounds. All that we can say is, that their existence is probable, but by no means certain. Nay, it may be (and we may never know it) that we are not the efficient causes of our own actions, which may be effected by the Deity or by ministering spirits; and this may even be true in the material world. But all this is indifferent to the real occupation of the philosopher, and does not affect either the certainty, the extent, or the utility of the knowledge which he may acquire.

We are now able to appreciate the high pretensions of the philosopher, and his claim to scientific superiority. We now see that this can neither be founded on any scientific superiority of his object, nor of his employment. His object is not causes; and his discoveries are nothing but the discovery of general facts, the discovery of physical laws: and his employment is the same with that of the descriptive historian. He observes and describes with care and accuracy the events of nature; and then he groups them into classes, in consequence of resembling circumstances, detected

in the midst of many others which are dissimilar and occasional. By gradually throwing out more circumstances of resemblance, he renders his classes more extensive; and, by carefully marking those circumstances in which the resemblance is observed, he characterises all the different classes: and, by a comparison of these with each other, in respect to the number of resembling circumstances, he distributes his classes according to their generality and subordination; thus exhausting the whole assemblage, and leaving nothing unarranged but accidental varieties. In this procedure it is to be remarked, that every grouping of similar events is, *ipso facto*, discovering a general fact, a physical law; and the expression of this assemblage is the expression of the physical law. And as every observation of this constancy of fact affords an opportunity for exerting the instinctive inference of natural connection between the related subjects, every such observation is the discovery of a power, property, or quality, of natural substance. And from what has been said, this observation of event is all we know of the connection, all we know of the natural power. And when the philosopher proceeds farther to the arrangement of events, according to their various degrees of complication, he is, *ipso facto*, making an arrangement of all natural powers according to their various degrees of subordinate influence. And thus his occupation is perfectly similar to that of the descriptive historian, classification and arrangement; and this constitutes all the science attainable by both.

PHILOSOPHY may therefore be defined, the study of the phenomena of the universe, with a view to discover the general laws which indicate the powers of natural substances, to explain subordinate phenomena, and to improve art: Or, in compliance with that natural instinct so much spoken of, Philosophy is the study of the phenomena of the universe, with a view to discover their causes, to explain subordinate phenomena, and to improve art.

The task is undoubtedly difficult, and will exercise our noblest powers. The employment is mainly in itself, and the result of it important. It therefore justly merits the appellation of *philosophy*, although its objects are nowise different from what occupy the attention of other men.

The employment of the philosopher, like that of the natural historian, is threefold; DESCRIPTION, ARRANGEMENT, and REFERENCE; while the objects are not *things* but *events*.

The description, when employed about events, may be more properly termed *history*. A philosophical history of nature consists in a complete or copious enumeration and narration of facts, properly selected, cleared of all unnecessary or extraneous circumstances, and accurately narrated. This constitutes the materials of philosophy. We cannot give a better example of this branch of philosophical occupation than astronomy.

From the beginning of the Alexandrian school to this day, astronomers have been at immense pains in observing the heavenly bodies, in order to detect their true motions. This has been a work of prodigious difficulty: for the appearances are such as might have been exhibited although the real motions had been extremely different. Not that our senses give

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The object of the philosopher the discovery of physical laws.

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us false information; but we form hasty, and frequently false judgments, from these informations; and call these things deceptions of sense, which are in fact errors of judgment. But the true motions have at last been discovered, and have been described with such accuracy, that the history may be considered as nearly complete. This is to be found in the usual systems of astronomy, where the tables contain a most accurate and synoptical account of the motion; so that we can tell with precision in what point of the heavens a planet *has been* seen at any instant that can be named.

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Phenomenology.

Sir Isaac Newton's Optics is such another perfect model of philosophical history, as far as it goes. This part of philosophy may be called PHENOMENOLOGY.

Having in this manner obtained the materials of philosophical description, we must put them into a compendious and perspicuous form, so that a general knowledge of the universe may be easily acquired and firmly retained. This is to be done by classification and arrangement, and this classification must proceed on resemblances *observed* in the events; and the subsequent arrangement must be regulated by the distinctions of which those resemblances are still susceptible. This assemblage of events into groups must be expressed. They are facts; therefore the expression must be propositions. These propositions must be what the logicians call *general* or *abstract* propositions; for they express, not any individual fact of the assemblage, but that circumstance in which they all resemble. Such propositions are the following: Proof is accompanied by belief; kindness is accompanied by gratitude; impulse is accompanied by motion. These are usually called *general facts*; but there are none such; every fact is individual. This language, however inaccurate, is very safe from misconstruction, and we may use it without scruple. These propositions are NATURAL OR PHYSICAL LAWS; and then the detecting and marking those resemblances in event, is the investigation of physical laws; and we may denominate this employment of the philosopher INVESTIGATION.

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Investigation.

In the prosecution of this task, it will be found that the similarities of fact are of various extent: and thus we shall form physical laws of various extent; and we shall also find that some are subordinate to others; for the resemblance of a number of facts in one circumstance does not hinder a part of them from also resembling in another circumstance: and thus we shall find subordinations of fact in the same way as of quiescent qualities. And it is found here, as in natural history, that our assemblage of resembling events will be the more extensive as the number of resembling circumstances is smaller; and thus we shall have kingdoms, classes, orders, genera, and species of phenomena, which are expressed by physical laws of all those different ranks.

It has been already observed, that this observation of physical laws is always accompanied by a reference of that uniformity of event to a natural bond of union between the concomitant facts which is conceived by us as the *cause* of this concomitancy; and therefore this procedure of the philosopher is considered as the discovery of those causes, that is, the discovery of those powers of natural substances which

constitute their physical relations, and may justly be called their distinguishing *qualities* or *properties*. This view of the matter gives rise to a new nomenclature and language. We give to those powers generic names, such as *sensibility, intelligence, irritability, gravity, elasticity, fluidity, magnetism, &c.* These terms, without exception, mark resembling circumstances of event; and no other definition can be given of them but a description of these circumstances. In a few cases which have been the subjects of more painful or refined discussion, we have proceeded farther in this abbreviation of language.

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We have framed the verb "to gravitate," and the verbal noun "gravitation," which purely expresses the fact, the phenomenon; but is conceived to express the operation or energy of the cause or natural power. It is of importance to keep in mind this metaphysical remark on these terms; for a want of attention to the pure meaning of the words has frequently occasioned very great mistakes in philosophical science.

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Aitiology.

We may with propriety call this part of the philosopher's employment AITIOLOGY.

We shall give an instance of its most successful application to the class of events already adduced as an example of philosophic history or phenomenology.

Kepler, a celebrated Prussian astronomer, having maturely considered the phenomena recorded in the tables and observations of his predecessors, discovered, amidst all the varieties of the planetary motions, three circumstances of resemblance, which are now known by the name of *Kepler's laws*.

50
Kepler's
laws as an
instance.

1. All the planets describe ellipses, having the sun in one focus.
2. The elliptic areas described by a planet in the different parts of its orbit, are proportional to the times of description.
3. The squares of the periodic times are proportional to the cubes of the mean distances from the sun.

By this observation or discovery, the study of the planetary motions was greatly promoted, and the calculation of their appearances was now made with a facility and an accuracy which surpassed all hopes: for the calculation of the place of a planet at any proposed instant was reduced to the geometrical problem of cutting off an area from an ellipse of known dimensions, which should bear the same proportion to the whole area, as the time for whose duration the motion is required, has to the known time of a complete revolution.

Long after this discovery of Kepler, Sir Isaac Newton found that these laws of Kepler were only particular cases of a fact or law still more general. He found that the deflections of the planets from uniform rectilinear motion were all directed to the sun; and that the simultaneous deflections were inversely proportional to the squares of the distances from him.

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Comprehended under one more general law,

Thus was established a physical law of vast extent: but further observation showed him, that the motion of every body of the solar system was compounded of an original motion of projection, combined with a deflection towards every other body; and that the simultaneous deflections were proportional to the quantity of matter in the body towards which they were directed,

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directed, and to the reciprocal of the square of the distance from it. Thus was the law made still more general. He did not stop here. He compared the deflection of the moon in her orbit with the simultaneous deflection of a stone thrown from the hand, and describing a parabola; and he found that they followed the same law, that is, that the deflection of the moon in a second, was 'o that of the stone in the same time, as the square of the stone's distance from the centre of the earth, to the square of the moon's distance from it. Hence he concluded, that the deflection of a stone from a straight line was just a particular instance of the deflections which took place through the whole solar system.

52
Called *gravitation*.

The deflection of a stone is one of the indications it gives of its being *gravis* or heavy; whence he calls it *gravitation*. He therefore expresses the physical law which obtains through the whole solar system, by saying that "every body *gravitates* to every other body; and the gravitations are proportional to the quantity of matter in that other body, and inversely proportional to the square of the distance from it."

Thus we see how the arrangement of the celestial phenomena terminated in the discovery of physical laws; and that the expression of this arrangement is the law itself.

Since the fall of a heavy body is one instance of the physical law, and since this fall is considered by all as the effect of its *weight*, and this weight is considered as the cause of the fall, the same cause is assigned for all the deflections observed in the solar system; and all the matter in it is found to be under the influence of this cause, or to be heavy; and thus his doctrine has been denominated the *system of universal gravitation*.

Philosophers have gone farther, and have supposed that gravity is a power, property, or quality, residing in all the bodies of the solar system. Sir Isaac Newton does not expressly say so, at least in that work where he gives an account of these discoveries. He contents himself with the immediate consequence of the first axiom in natural philosophy, viz. that every body remains in a state of rest, or of uniform rectilinear motion, unless affected by some moving force. Since the bodies of the solar system are neither in a state of rest, nor of uniform rectilinear motion, they must be considered as so affected; that is, that there operates on every one of them a moving force, directed towards all the others, and having the proportions observed in the deflection.

53
Attempts to include this law under impulse.

Other philosophers have endeavoured to show, that this general fact, detected by Sir Isaac Newton, is included in another still more general, viz. that every body moves which is impelled by another body in motion. They assert, that all the bodies of the solar system are continually impelled by a fluid which they call *ether*, which is moving in all places, and in all directions, or in circular vortices, and hurries along with it the planets and all heavy bodies. It would seem that the familiarity of motion produced by impulse, at least in those instances in which our own exertions are most employed, has induced philosophers to adopt such notions; perhaps, too, they are influenced by an obscure and indistinct notion affixed to the term action, as applied to changes in the material world,

and which has given rise to an axiom, "that a body cannot act at a distance, or where it is not;" and thus have thought themselves obliged to look out for an immediate and contiguous agent in all those phenomena.

But the philosophers who profess to be most scrupulous in their adherence to the rules of philosophic discussion, deny the legitimacy of this pretended investigation of causes, saying that this doctrine is in direct opposition to the procedure of the mind in acquiring the knowledge of causes. Since the *fact* of impulse is not really observed in the celestial deflections, nor in the motions of heavy bodies, the law cannot be inferred. They say that it is not even necessary to show that the phenomena of the celestial motions are unlike the phenomena of impulse, although this can be done in the completest manner. It is enough that neither the fluid nor the impulse are observed; and therefore they are in the right when they assert, that there is inherent in, or accompanies all the bodies of the system, a power by which they deflect to one another. (See OPTICS, n^o 66, 67.)

54
While impulse itself is never observed.

The debate is foreign to our present purpose, which is only to show how the observation and arrangement of phenomena terminates in the discovery of their causes, or the discovery of the powers or properties of natural substances.

This is a task of great difficulty, as it is of great importance. There are two chief causes of this difficulty.

1. In most of the spontaneous phenomena of nature there is a complication of many events, and some of them escape our observation. Attending only to the most obvious or remarkable, we conjoin these only in our imagination, and are apt to think these the concomitant events in nature, the proper indication of the cause, and the subjects of this philosophical relation, and to suppose that they are always conjoined by nature. Thus it was thought that there resided in a vibrating chord a power by which the sensation of sound was excited, or that a chord had a sounding quality. But late observations have shown clearly that there is an inconceivable number of events interposed between the vibration of the chord and the sensitive affection of our ear; and therefore, that sound is not the effect of the vibration of the chord, but of the very last event of this series: and this is completely demonstrated by showing that the vibration and the sound are not necessarily connected, because they are not *always* connected, but require the interposition of air or of some other elastic body.

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Causes of the difficulty of philosophical investigation.

These observations show the necessity of the most accurate and minute observation of the phenomena, that none of those intermediate events may escape us, and we be thus exposed to the chance of imaginary connections between events which are really far asunder in the procedure of nature. As the study has improved, mistakes of this kind have been corrected; and philosophers are careful to make their trains of events under one name as short as possible. Thus, in medicine, a drug is no longer considered as a *specific* remedy for the disease which is sometimes cured when it has been used, but is denominated by its most immediate operation on the animal frame: it is no longer called a *febrifuge*, but a *sudorific*.

2. When

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Means of
insuring
success.

2. When many natural powers combine their influence in a spontaneous phenomenon of nature, it is frequently very difficult to discover what part of the complicated effect is the effect of each; and to state those circumstances of similarity which are the foundation of a physical law, or intitle us to infer the agency of any natural power. The most likely method for insuring success in such cases is to get rid of this complication of event, by putting the subject into such a situation that the operation of all the known powers of nature shall be suspended, or so modified as we may perfectly understand *their* effects. We can thus appreciate the effects of such as we could neither modify nor suspend, or we can discover the existence of a new law, the operation of a new power.

This is called *making an experiment*; and is, of all, the most effectual way of advancing in the knowledge of nature, and has been called EXPERIMENTAL PHILOSOPHY.

57
A seeming
anomaly
explained.

It seems, however, at first sight, in direct opposition to the procedure of nature in forming general laws. These are formed by induction from multitudes of individual facts, and must be affirmed to no greater extent than the induction on which they are founded. Yet it is a matter of fact, a physical law of human thought, that one simple, clear, and unequivocal experiment, gives us the most complete confidence in the truth of a general conclusion from it to every similar case. Whence this anomaly? It is not an anomaly or contradiction of the general maxim of philosophical investigation, but the most refined application of it. There is no law more general than this, that "Nature is constant in all her operations." The judicious and simple form of our experiment insures us (we imagine) in the complete knowledge of all the circumstances of the event. Upon this supposition, and this alone, we consider the experiment as the faithful representative of every possible case of the conjunction. This will be more minutely considered afterwards.

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Theory or
explanation
of subordinate
phenomena.

The last branch of philosophic occupation is the explanation of subordinate phenomena. This is nothing more than the referring any particular phenomenon to that class in which it is included; or, in the language of philosophy, it is the pointing out the general law, or that general fact of which the phenomenon is a particular instance. Thus the feeling of the obligations of virtue is thought to be explained, when it is shown to be a particular case of that regard which every person has for his dearest interests. The rise of water in pumps is explained, when we show it to be a particular case of the pressure of fluids, or of the air. The general law under which we show it to be properly arranged is called the PRINCIPLE of the explanation, and the explanation itself is called the THEORY of the phenomenon. Thus Euler's explanation of the lunar irregularities is called a theory of the lunar motions on the principle of gravitation.

This may be done either in order to advance our own knowledge of nature, or to communicate it to others. If done with the first view, we must examine the phenomenon minutely, and endeavour to detect every circumstance in it, and thus discover all the known laws of nature which concur in its production; we then appreciate the operation of each according to the circumstances of its exertion; we then combine all these, and compare the result with the pheno-

menon. If they are similar, we have explained the phenomenon. We cannot give a better example than Franklin's explanation of the phenomena of thunder and lightning. See LIGHTNING, and ELECTRICITY Index.

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If we explain a phenomenon from known principles, we proceed synthetically from the general law already established and *known* to exert its influence in the present instance. We state this influence both in kind and degree according to the circumstances of the case; and having combined them, we compare the result with the phenomenon, and show their agreement, and thus it is explained. Thus, because all the bodies of the solar system mutually gravitate, the moon gravitates to the sun as well as to the earth, and is continually, and in a certain determinate manner, deflected from that path which she would describe did she gravitate only to the earth. Her motion round the earth will be retarded during the first and third quarters of her orbit, and accelerated during the second and fourth. Her orbit and her period will be increased during our winter, and diminished during our summer. Her apogee will advance, and her nodes will recede; and the inclination of her orbit will be greatest when the nodes are in syzygie, and least when they are in quadrature. And all these variations will be in certain precise degrees. Then we show that all these things actually obtain in the lunar motions, and they are considered as explained.

This summary account of the object and employment in all philosophical discussion is sufficient for pointing out its place in the circle of the sciences, and will serve to direct us to the proper methods of prosecuting it with success. Events are its object; and they are considered as connected with each other by causation, which may therefore be called the philosophical relation of things. The following may be adopted as the fundamental proposition on which all philosophical discussion proceeds, and under which every philosophical discussion or discovery may be arranged:

"Every change that we observe in the state or condition of things is CONSIDERED BY US as an effect, indicating the agency, characterising the kind, and determining the degree of its INFERRED cause."

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Fundamen-
tal proposi-
tion of phi-
losophical
discussion

As thus enounced, this proposition is evidently a physical law of human thought. It may be enounced as a necessary and independent truth, by saying, *every change in the state and condition of things IS AN EFFECT, &c.* And accordingly it has been so enounced by Dr Reid*; * *Essays on the Intellectual Powers of Man.* and its title to this denomination has been abundantly supported by him. But we have no occasion to consider it as possessing this quality. We are speaking of philosophy, which is something contingent, depending on the existence and constitution of an intellectual being such as man; and, in conformity to the view which we have endeavoured to give of human knowledge in the subjects of philosophical relation, it is quite sufficient for our purpose that we maintain its title to the rank of an universal law of human thought. This will make it a first principle, even although it may not be a necessary truth.

All the proof necessary for this purpose is universality of fact; and we believe this to be without exception. We are not to expect that all mankind have made,

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or will ever make, a formal declaration of their opinion; but we may venture to say that all have made it, and continually do make it, virtually. What have the philosophers of all ages been employed about but the discovery of the causes of those changes that are incessantly going on? *Nil turpius physico* (says Cicero) *quam fieri sine causis quidquam dicere*. Human curiosity has been directed to nothing so powerfully and so constantly as to this. Many absurd causes have been assigned for the phenomena of the universe; but no set of men have ever said that they happened without a cause. This is so repugnant to all our propensities and instincts, that even the atheistical sect, who, of all others, would have profited most by the doctrine, have never thought of advancing it. To avoid so shocking an absurdity, they have rather allowed that chance, that the concurrence of atoms, are the causes of the beautiful arrangements of nature. The thoughtless vulgar are no less solicitous than the philosophers to discover the cause of things; and the poet expresses the natural and instinctive passion of all men, when he says,

Felix qui potuit rerum cognoscere causas.

And this anxiety is not to nourish, but to get rid of superstitious fears: for thus

— *metus omnes, et inexorabile fatum*

Subiecit pedibus, strepitumque Acherontis avari.

Had men never speculated, their conduct alone gives sufficient evidence of the universality of the opinion. The whole conduct of man is regulated by it, nay almost wholly proceeds upon it, in the most important matters, and where experience seems to leave us in doubt: and to act otherwise, as if any thing whatever happened without a cause, would be a declaration of insanity. Dr Reid has beautifully illustrated this truth, by observing, that even a child will laugh at you if you try to persuade him that the top, which he misses from the place where he left it, was taken away by nobody. You may persuade him that it was taken away by a fairy or a spirit; but he believes no more about this nobody, than the master of the house when he is told that nobody was the author of any piece of theft or mischief. What opinion would be formed, says Dr Reid, of the intellects of the juryman, on a trial for murder by persons unknown, who should say that the fractured skull, the watch and money gone, and other like circumstances, might possibly have no cause? he would be pronounced insane or corrupted.

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Controlled by
Mr Hume

We believe that Mr Hume is the first author who has ventured to call the truth of this opinion in question; and even he does it only in the way of mere possibility. He acknowledges the *generality* of the opinion; and he only objects to the foundation of this generality: and he objects to it merely because it does not quadrate with his theory of belief; and therefore it may happen that some men may have no such opinion. But it must be observed on this occasion, that the opinion of a philosopher is of no greater weight in a case like this than that of a ploughboy. If it be a first principle, directing the opinions and actions of all, it must operate on the minds of all. The philosopher is the only person who may chance to be without it: for it requires much labour, and long habits reso-

lutely maintained, to warp our natural sentiments; and experience shows us that they may be warped if we are at sufficient pains. It is also worthy of remark, that this philosopher seems as much under the influence of this law as ordinary mortals. It is only when he is aware of its not tallying with his other doctrines that his scruples appear. Observe how he speaks when off his guard: "As to those impressions which arise from the senses, their ultimate cause is, in my opinion, perfectly inexplicable by human reason; and it will always be impossible to decide with certainty whether they arise immediately from the object, are produced by the creative power of the mind, or are derived from the Author of our being."

Among these alternatives he never thought of their not being derived from any cause.

But it is not enough to show that this is a physical law of the human mind: we have assumed it as a first principle, the foundation of a whole science; therefore not included in or derived from any thing more general. Mr Hume's endeavours to show that it is not a necessary truth, show with sufficient evidence that most attempts to derive it in the way of argument are *petitiones principii*; a thing very commonly met with in all attempts to prove first principles. It cannot be proved by induction of facts that every event has a cause, because induction always supposes an *observed fact* or event. Now in by far the greatest number of events the causes are unknown. Perhaps in no event whatever do we know the real cause, or that power or energy which, without any intervention, produces the effect. No man can say, that in the simplest event which he ever observed, he was fully apprised of every circumstance which concurred to its production. We suppose that no event in nature can be adduced more simple than the motion of a suspended glass ball when gently struck by another glass ball; and we imagine that most of our readers will say that he perfectly sees every thing which happens in this phenomenon. We believe, too, that most of our readers are of opinion that a body is never put in motion but by the impulse of another, except in the cases of animal motion; and that they are disposed to imagine that magnets put iron in motion, and that an electrified body moves another by means of an interposed though invisible fluid somehow circulating round them. Now we must inform such readers, that unless the stroke has been very smart, so smart indeed as to shatter the glass balls, the motion of the suspended ball was produced without impulse: that is, the two balls were not in contact during the stroke; and the distance between them was not less than the eighth part of an inch, and probably much greater. We must say farther, that it is not certain that even the most violent stroke, such as would shatter them to pieces, is enough to bring them into real contact. The proofs of this singular position are too long for this place; but the evidence will be sufficiently seen by consulting the article *Orries*, n^o 66, 67.

Unless, therefore, our readers are willing to allow that the suspended ball was put in motion by a repulsive force inherent in one or both balls, they must acknowledge that they do not fully know all the circumstances of this so simple phenomenon, or all the causes of events which happen in it; and therefore they are reduced to the necessity of *supposing*, although that be

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What great
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This proposition is
the first principle
of the science
of philosophy

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not see it, an intervening fluid or matter, by the immediate action of whose *adjoining* particles the motion is produced.

This being the case in the simplest phenomenon that we can pitch upon, what shall we say of the numberless multitudes which are incomparably more complex? Must we not acknowledge that the efficient causes, even in the vulgar sense of the word, the immediately preceding events, are unknown, because the conjunctions are not observed? and therefore it cannot be said that it is from experimental induction that this truth gains universal belief. Experience, so far from supporting it as a direct proof, seems rather the strongest argument against it; for we have no experiment of unquestionable authority but the narrow circle of our own power exerted on our thoughts and actions. And even here there are perhaps cases of change where we cannot say with certainty that we perceive the efficient cause.

Nothing seems to remain, therefore, but to allow that this physical law of human judgment is instinctive, a constituent of the human soul, a first principle; and incapable of any other proof than the appeal to the feelings of every man.

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Causes not
observed
but inferred
from the
phenomena
which are
the lan-
guage of
nature.

Simply to say, that every change is considered as an effect, is not giving the whole characters of this physical law. The cause is not always, perhaps never, *observed*, but is *inferred* from the phenomena. The inference is therefore in every instance dependant on the phenomenon. The phenomenon is to us the language of nature: It is therefore the sole indication of the cause and of its agency: It is therefore the indication of the very cause, and of no other. The observed change therefore characterises the cause, and marks its kind. This is confirmed by every word of philosophical language, where, as has already been observed, the names of the inferred powers of nature are nothing but either abbreviated descriptions of the phenomena, or terms which are defined solely by such descriptions. In like manner, the phenomenon determines the cause in a *particular degree*, and in no other; and we have no immediate measure of the degree of the cause but the phenomenon itself. We take many measures of the cause, it is true; but on examination they will be found not to be immediate measures of the cause, but of the effect. Assuming gravitation as the cause of the planetary deviations from uniform rectilinear motion, we say that the gravitation of the moon is but $\frac{1}{1000}$ th part of the gravitation of a stone thrown from the hand: but we say this only from observing that the deflection of the stone is 3600 times greater than the simultaneous deflection of the moon. In short, our whole knowledge of the cause is not only *founded* on our knowledge of the phenomenon, but *it is the same*. This will be found a remark of immense consequence in the prosecution of philosophical researches; and a strict attention to it will not only guard us against a thousand mistakes into which the reasoning pride of man would continually lead us, but will also enable us fully to detect many egregious and fatal blunders made in consequence of this philosophical vanity. Nothing can be more evident than that whenever we are puzzled, it would be folly to continue groping among those obscure beings called *causes*, when we have their prototypes, the phenomena themselves, in our hands.

Such is the account which may be given of philosophy, the study of the works of God, as related by causation. It is of vast extent, reaching from an atom to the glorious Author of the Universe, and contemplating the whole connected chain of intelligent, sensitive, and inanimate beings. The philosopher makes use of the descriptions and arrangements of the natural historian as of mighty use to himself in the beginning of his career; confiding in the uniformity of nature, and expecting that similarity in the quiescent properties of things will be accompanied by some resemblances in those more important properties which constitute their mutual dependences, linking them together in a great and endlessly ramified chain of events.

We have endeavoured to ascertain with precision the peculiar province of philosophy, both by means of its object and its mode of procedure. After this it will not require many words to point out the methods for prosecuting the study with expedition and with success. The rules of philosophizing, which Newton premises to his account of the planetary motions, which he so scrupulously followed, and with a success which gives them great authority, are all in strict conformity to the view we have now given of the subject.

The chief rule is, that similar causes are to be assigned to similar phenomena. This is indeed the source of all our knowledge of connected nature; and without it the universe would only present to us an incomprehensible chaos. It is by no means, however, necessary to enjoin this as a maxim for our procedure: it is an instinctive propensity of the human mind. It is absolutely necessary, on the contrary, to caution us in the application of this propensity. We must be extremely confident in the certainty of the resemblance before we venture to make any inference. We are prone to reason from analogy: the very employment is agreeable; and we are ever disposed to embrace opportunities of engaging in it. For this reason we are satisfied with very slight resemblances, and eagerly run over the consequences, as if the resemblances were complete; and our researches frequently terminate in falsehood.

This propensity to analogical reasoning is aided by another equally strong, and equally useful, when properly directed; we mean the propensity to form general laws: it is in fact a propensity to discover *causes*, which is equivalent to the establishing of general laws. It appears in another form, and is called a love of or taste for simplicity; and this is encouraged or justified as agreeable to the uniformity and simplicity of nature. "*Natura semper sibi similis et consona*," says Newton; "*Frustra fit per plura, quod fieri potest per pauciora*," says another. The beautiful, the wise economy of nature, are phrases in every body's mouth; and Newton enjoins us to adopt no more causes than are sufficient to explain the phenomena. All this is very well, and is true in its own degree; but it is too frequently the subterfuge of human vanity and self-love. This inordinate admiration of the economy and simplicity of nature is generally conjoined with a manifest love of system, and with the actual production of some new system, where from one general principle some extensive theory or explanation is deduced and offered to the world. The author sees a *sort* of resemblance

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blame between a certain series of phenomena and the consequences of some principle, and thinks the principle adequate to their explanation. Then, on the authority of the acknowledged simplicity of nature, he roundly excludes all other principles of explanation; because, says he, this principle is sufficient "et frustra fit per plura," &c. We could point out many instances of this kind in the writings of perhaps the first mathematician and the poorest philosopher of this century; where extensive theories are thus cavalierly exhibited, which a few years examination have shown to be nothing but analogies, intuitively observed, and, what is worse, inaccurately applied.

To regulate these hazardous propensities, and keep philosophers in the right path, Newton inculcates another rule, or rather gives a modification of this injunction of simplicity. He enjoins, that no cause shall be admitted but what is real. His words are, that *no causes shall be admitted but such as are true, and sufficient to account for the phenomena*. We apprehend that the meaning of this rule has been mistaken by many philosophers, who imagine that by *true* he means causes which really exist in nature, and are not mere creatures of the imagination. We have met with some who would boggle at the doctrines of Aristotle respecting the planetary motions, viz. that they are carried along by conducting intelligent minds, because we know of *none such* in the universe; and who would nevertheless think the doctrine of the Cartesian vortices deserving of at least an examination, because we see such vortices exist, and produce effects which have some resemblance to the planetary motions, and have justly rejected them, *solely* because this resemblance has been very imperfect. We apprehend Newton's meaning by these words is, that no cause of any event shall be admitted, or even considered, which we *do not know* to be actually concurring or exerting some influence in *that very event*. If this be his meaning, he would reject the Cartesian vortices, and the conducting spirits of Aristotle for one and the same reason; not because they were not adequate to the explanation, nor because such causes did not exist in nature, but because we did not *find them* anyhow concerned in the phenomenon under consideration. We neither see a spirit nor a vortex, and therefore need not trouble ourselves with enquiring what effects they would produce. Now we know that this was his very conduct, and what has distinguished him from all philosophers who preceded him, though many, by following his example, have also been rewarded by similar success. This has procured to Newton the character of the *modest* philosopher; and modest his procedure may, for distinction's sake, be called, because the contrary procedure of others did not originate so much from ignorance as from vanity. Newton's conductor in this was not modesty, but sagacity, prudence, caution, and to say it purely, it was sound judgment.

For the bonds of nature, the supposed philosophical causes are not *observed*; they are *inferred* from the phenomena. When two substances are observed, and only when they are observed, to be connected in any series of events, we *infer* that they are connected by a natural power: but when one of the substances is not seen, but fancied, no law of human thought produces any inference whatever. For this reason alone New-

ton stopped short at the last *fact* which he could discover in the solar system, that all bodies were deflected to all other bodies, according to certain regulations of distance and quantity of matter. When told that he had done nothing in philosophy, that he had discovered no cause, and that to merit any praise he must show how this deflection was produced;—he said, that he knew no more than he had told them; that he saw nothing causing this deflection; and was contented with having described it so exactly, that a good mathematician could now make tables of the planetary motions as accurate as he pleased, and with *hoping* in a few years to have every purpose of navigation and of philosophical curiosity completely answered; and he was not disappointed. And when philosophers on all sides were contriving hypothetical fluids and vortices which would produce these deflections, he contented himself with showing the total inconsistency of these explanations with the mechanical principles acknowledged by their authors; showing that they had transgressed both parts of his rule, their causes neither being real nor sufficient for explaining the phenomena. A cause is sufficient for explaining a phenomenon only when its legitimate consequences are perfectly agreeable to these phenomena.

Newton's discoveries remain without any diminution or change: no philosopher has yet advanced a step further.

But let not the authority, or even the success, of Newton be our guide. Is his rule founded in reason? It surely is. For if philosophy be only the interpretation of nature's language, the inference of causes from the phenomena, a fancied or hypothetical phenomenon can produce nothing but a fanciful cause, and can make no addition to our knowledge of real nature.

All hypotheses therefore must be banished from philosophical discussion as frivolous and useless, administering to vanity alone. As the explanation of any appearance is nothing but the pointing out the general fact, of which this is a particular instance, a hypothesis can give no explanation: knowing nothing of cause and effect but the conjunction of two events, we see nothing of causation where one of the events is hypothetical. Although all the legitimate consequences of a hypothetical principle should be perfectly similar to the phenomenon, it is extremely dangerous to assume this principle as the real cause. It is illogical to make use of the economy of nature as an argument for the truth of any hypothesis: for if true, it is a physical truth, a matter of fact, and true only to the extent in which it is observed, and we are not intitled to say that it is so one step further; that it is not a *mere* *cause till it be observed*. But the proposition that nature is so economical is false; and it is no other, which has been so lately quoted in by the *author* of the *fact*, for it is not the *author* who are *deceived* by it, they are generally led by their own vanity. Nothing is more observable than the prodigious variety of nature. That the same phenomena may be produced by different means is well known to the astronomer, who must all grant, that the appearance of a comet will be precisely the same whether the earth moves round the sun like the other planets, or whether the sun with his attendant planets move round the earth; and that

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the demonstration of the first opinion is had from a fact totally unconnected with all the defections or even with their causes: for it may be asserted, that Dr Bradley's discovery of the aberration of the fixed stars, in consequence of the progressive motion of light, was the first thing which put the Copernican system beyond question; and even this is still capable of being explained in another way. The Author of Nature seems to delight in variety; and there cannot be named a single purpose in which the most inconceivable fertility in resource is not observed. It is the most delightful occupation of the curious mind and the sensible heart to contemplate the various contrivances of nature in accomplishing similar ends.

As a principle therefore on which to found any maxim of philosophical procedure, this is not only injudicious, because imprudent and apt to mislead, but as false, and almost sure to mislead. In conformity to this observation, it must be added, that nothing has done so much harm in philosophy as the introduction of hypotheses.

Authors have commonly been satisfied with very slight resemblances, and readers are easily misled by the appearances of reasoning which these resemblances have countenanced. The ancients, and above all Aristotle, were much given to this mode of explanation, and have filled philosophy with absurdities. The slightest resemblances were with them sufficient foundations of theories. It has been by very slow degrees that men have learned caution in this respect; and we are sorry to say that we are not yet cured of the disease of hypothetical systematizing, and to see attempts made by ingenious men to bring the frivolous theories of antiquity again into credit. Nay, modern philosophers even of the greatest name are by no means exempted from the reproach of hypothetical theories. Their writings abound in ethers, nervous fluids, animal spirits, vortices, vibrations, and other invisible agents. We may affirm that all these attempts may be shown to be either unintelligible, fruitless, or false. Either the hypothesis has been such that no consequence can be distinctly drawn from it, on account of its obscurity and total want of resemblance to any thing we know; or the just and legitimate consequences of the hypothesis are inconsistent with the phenomena (N). This is remarkably the case in the hypotheses which have been introduced for the explanation of the mechanical

phenomena of the universe. These can be examined by accurate science, and the consequences compared without any mistake; and nothing else but a perfect agreement should induce us even to listen to any hypothesis whatever.

It may here be asked, Whether, in the case of the most perfect agreement, after the most extensive comparison, the hypothesis should be admitted? We believe that this must be left to the feelings of the mind. When the belief is irresistible, we can reason no more. But as there is no impossibility of as perfect an agreement with some other hypothesis, it is evident that it does not convey an irrefragable title to our hypothesis. It is said, that such an agreement authorises the reception of the hypothetical theory in the same manner as we must admit that to be the true cypher of a letter which will make perfect sense of it. But this is not true: in decyphering a letter we know the sounds which must be represented by the characters, and that they are really the constituents of speech: but in hypothetical explanations the first principle is not known to exist; nay, it is possible to make two cyphers, each of which shall give a meaning to the letter. Instances of this are to be seen in treatises on the art of decyphering; and there has been lately discovered a national character (the *ogam* discovered in Ireland) which has this property.

We conclude our criticism on hypothetical explanations with this observation, that it is impossible that they can give any addition of knowledge. In every hypothesis we thrust in an intermediate event between the phenomenon and some general law; and this event is not seen, but supposed. Therefore, according to the true maxims of philosophical investigation, we give no explanation; for we are not by this means enabled to assign the general law in which this particular phenomenon is included: nay, the hypothesis makes no addition to our list of general laws; for our hypotheses must be selected, in order to tally with all the phenomena. The hypothesis therefore is understood only by and in the phenomena; and it must not be made more general than the phenomena themselves. The hypothesis gives no generalisation of facts. Its very application is founded on a great coincidence of facts; and the hypothetical fact is thrust in between two which we really observe to be united by nature. The applicability therefore of the hypothesis is not more

(N) It has often been matter of amusement to us to examine the hypothetical theories of ingenious men, and to observe the power of nature even when we are transgressing her commands, *Naturam expellat furca, tamen usque revertitur*. The hypothesis of an ingenious man is framed in perfect conformity to nature's dictates: for you will find that the hypothetical cause is touched and retouched, like the first sitting of a picture, till it is made to resemble the phenomena, and the cause is still inferred, nay explained, in spite of all his ingenuity, from the phenomenon; and then, instead of desiring the spectators to pay him his due praise, by saying that the picture is like the man, he insists that they shall say, what gives him no credit, that the man is like the picture. But, alas! this is seldom the case: The picture is generally an anamorphosis, unlike any thing extant in nature, and having parts totally incongruous. We have seen such pictures, where a wood is standing on the sea, and an eye is on the end of an elephant's trunk; and yet when this was viewed through a proper glass, the wood became an eyebrow to the eye, and the proboscis was a very pretty ringlet of hair. We beg indulgence for this piece of levity, because it is a most apposite illustration of a hypothetical theory. The resemblance between the principle and phenomenon is true only in detached unconnected scraps, and the principle itself is an incongruous patchwork. But by a perversion of the rules of logic, all these inconsistencies are put out of view, and the explanation is something like the phenomenon.

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extensive than the similarity of facts which we observe, and the hypothetical law is not more general than the observed law. Let us then throw away entirely the hypothetical law, and insert the observed one in our list of general laws: it will be in different language from the hypothetical law, but it will express the same facts in nature.

It is in experimental philosophy alone that hypotheses can have any just claim to admission; and here they are not admitted as explanations, but as conjectures serving to direct our line of experiments.

Effects only appear ; and by their appearance, and the previous information of experience, causes are immediately ascertained by the perfect similarity of the whole train of events to other trains formerly observed : Or they are suggested by more imperfect resemblances of the phenomena ; and these suggestions are made with stronger or fainter evidence, according as the resemblance is more or less perfect. These suggestions do not amount to a confidential inference, and only raise a conjecture. Wishing to verify or overturn this conjecture, we have recourse to experiment ; and we put the subject under consideration in such a situation, that we can say what will be the effect of the conjectural cause if real. If this tallies with the appearance, our conjecture has more probability of truth, and we vary the situation, which will produce a new set of effects of the conjectured cause, and so on. It is evident that the probability of our conjecture will increase with the increase of the conformity of the legitimate effects of the supposed cause with the phenomena, and that it will be entirely destroyed by one disagreement. In this way conjectures have their great use, and are the ordinary means by which experimental philosophy is improved. But conjectural systems are worse than nonsense, filling the mind with false notions of nature, and generally leading us into a course of improper conduct when they become principles of action. This is acknowledged even by the abettors of hypothetical systems themselves, when employed in overturning those of their predecessors, and establishing their own : witness the successive maintainers of the many hypothetical systems in medicine, which have had their short-lived course within these two last centuries.

Let every person therefore who calls himself a philosopher resolutely determine to reject all temptations to this kind of system-making, and let him never consider any composition of this kind as any thing better than the amusement of an idle hour.

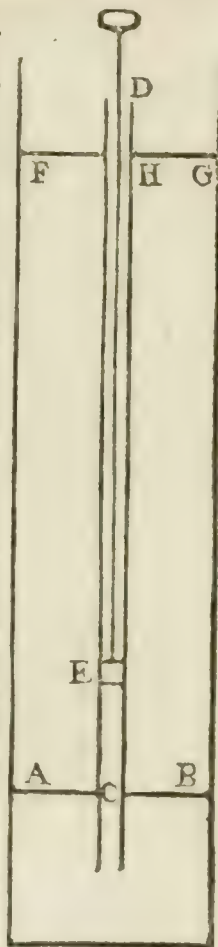
After these observations, it cannot require much discussion to mark the mode of procedure which will insure progress in all philosophical investigations.

The sphere of our intuitive knowledge is very limited; and we must be indebted for the greatest part of our intellectual attainments to our rational powers, and it must be deductive. In the spontaneous phenomena of nature, whether of mind or body, it seldom happens that the energy of that natural power, which is the principle of explanation, is so immediately connected with the phenomenon that we see the connection at once. Its exertions are frequently concealed, and in all cases modified, by the joint exertions of other natural powers: the particular exertion of each must be considered apart, and their mutual connection traced out. It is only in this way that we can

discover the perhaps long train of intermediate operations, and also see in what manner and degree the real principle of explanation concurs in the ostensible process of nature.

In all such cases it is evident that our investigation (and investigation it most strictly is) must proceed by steps, conducted by the sure hand of logical method. To take an instance from the material world, let us listen to Galileo while he is teaching his friend's the cause of the rise of water in a pump. He says that it is owing to the pressure of the air. This is his principle; and he announces it in all its extent. All matter, says he, is heavy, and in particular air is heavy. He then points out the connection of this general principle with the phenomenon.

Air being heavy, it must be supported: it must lie and press on what supports it: it must press on the surface AB of the water in the cistern surrounding the pipe CD of the pump; and also on the water C within this pipe. He then takes notice of another general principle which exerts its subordinate influence in this process. Water is a fluid; a fluid is a body whose parts yield to the smallest impression; and, by yielding, are easily moved among themselves: and no little parcel of the fluid can remain at rest unless it be equally pressed in every direction, but will recede from that side where it sustains the greatest pressure. In consequence of this fluidity, *known* to be a property of water, if any part of it is pressed, the pressure is propagated thro' the whole; and if not resisted on every side, the water will move to that side where the propagated pressure is not resisted. All these subordinate or collateral propositions are supposed to be previously demonstrated or allowed. Water therefore must yield to the pressure of the air unless pressed by it on every side, and must move to that side where it is not with held by some opposite pressure. He then



proceeds to now, from the structure of the pump, that there is no opposing reflux on the water in the inside of the pump. "For," (says he) suppose the piston thrust down till it touches the surface of the water in the pipe; suppose the piston now drawn up by a power sufficient to lift it, and all the air incumbent on it; and suppose it drawn up a foot or a fathom—there remains nothing now (says he) that I know of, to press on the surface of the water. In short (says he), gentlemen, it appears to me, that the water in the pump is in the same situation that it would be in were there no air at all, but water poured into the cistern to a height AF; such, that the column of water FABG

4 F 2

presses

4 F 2

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On what
occasions
they may
be useful.

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True mode
of philoso-
phical pro-
cedure.

A well
known
fact.

presses on the surface AB as much as the air does. Now in this case we know that the water at C is pressed upwards with a force equal to the weight of a column of water, having the section of the pipe for its base and CH for its height. The water below C therefore will be pressed up into the pipe CD, and will rise to G, so that it is on a level with the external water FG; that is, it will rise to H. This is a necessary consequence of the weight and pressure of the incumbent column FALG, and the fluidity of the water in the column. Consequences perfectly similar must necessarily follow from the weight and pressure of the air; and therefore on drawing up the piston from the surface C of the water, with which it was in contact, the water must follow it till it attain that height which will make its own weight a balance for the pressure of the circumambient air. Accordingly, gentlemen, the Italian philosophers inform me, that a pump will not raise water quite fifty palms; and from their information I conclude, that a pillar of water fifty palms high is somewhat heavier than a pillar of air of the same base, and reaching to the top of the atmosphere."

The sy-
stematic
method.

This is the phenomenon explained. The rise of the water in the pump is shown to be a particular case of the general fact in hydrostatics, that fluids in communicating vessels will stand at heights which are inversely as their densities, or that columns of equal weights are in equilibrio.

This way of proceeding is called arguing *a priori*, the synthetic method. It is founded on just principles; and the great progress which we have made in the mathematical sciences by this mode of reasoning flows to what length it may be carried with irresistible evidence. It has long been considered as the only inlet to true knowledge; and nothing was allowed to be known with certainty which could not be demonstrated in this way to be true. Accordingly logic, or the art of reasoning, which was also called the art of discovering truth, was nothing but a set of rules for successfully conducting this mode of argument.

Under the direction of this infallible guide, it is not surely unreasonable to expect that philosophy has made sure progress towards perfection; and as we know that the brightest geniuses of Athens and of Rome were for ages solely occupied in philosophical researches in every path of human knowledge, it is equally reasonable to suppose that the progress has not only been sure but great. We have seen that the exhibition of an appearance in nature is nothing but the arrangement of it into that general class in which it is comprehended. The class has its distinguishing marks, which, when it is found in the phenomenon under consideration, fixes it in its class, there to remain for ever an addition to our stock of knowledge. Nothing can be lost any other way but by forgetting it; and the doctrines of philosophers must be stable like the laws of nature.

We have seen, however, that the very reverse of all this is the case; that philosophy has but very lately emerged from worse than total darkness and ignorance; that what passed under the name of philosophy was nothing but systems of errors (if systems they could be called), which were termed doctrines, delivered with the most imposing apparatus of logical demonstration, but belied in almost every instance by experience, and

affording us no assistance in the application of the powers of nature to the purposes of life. Nor will this excite much wonder in the mind of the enlightened reader of the present day, who reflects on the use that in this dialectic process was made of the *categories*, and the method in which those categories were formed. From first principles too vague in themselves, and so gratuitously assumed, ingenious men might deduce many different conclusions all equally erroneous: and that this was actually done, no surer evidence can be given, than that hardly a lifetime elapsed in which the whole system of doctrines which had captivated the minds of the most penetrating, have been oftener than once exploded and overturned by another system, which flourished for a while, and then was supplanted by a third which shared the same fate. Here was an infallible proof of their error, for infallibility is incompatible with truth.

It is allowed by all that this has been the case in those branches of study at least which contemplate the philosophical relations of the material world, in astronomy, in mechanical philosophy, in chemistry, in physiology, in medicine, in agriculture. It is also acknowledged, that in the course of less than two centuries back we have acquired much knowledge on these very subjects, call it philosophy, or by what name you will, so much more conformable to the natural course of things, that the deductions made from it by the same rules of the synthetic method are more conformable to fact, and therefore better fitted to direct our conduct and improve our powers. It is also certain that these bodies of doctrine which go by the name of philosophical systems, have much more stability than in ancient times; and though sometimes in part superseded, are seldom or never wholly exploded.

This cannot perhaps be assumed with equal confidence with respect to those speculations which have our intellect or propensities for their object: and we have not perhaps attained such a representation of human nature as will bear comparison with the original; nor will the legitimate deductions from such doctrines be of much more service to us for directing our conduct than those of ancient times: and while we observe this difference between these two general classes of speculations, we may remark, that it is conjoined with a difference in the manner of conducting the study. We have proceeded in the old Aristotelian method when investigating the nature of mind; but we see the material philosophers running about, passing much of their time away from books in the shop of the artisan, or in the open fields engaged in observation, labouring with their hands, and busy with experiments. But the speculatist on the intellect and the active powers of the human soul seems unwilling to be indebted to any thing but his own ingenuity, and his labours are confined to the closet. In the first class, we have met with something like success, and we have improved many arts: in the other, it is to be feared that we are not much wiser, or better, or happier, for all our truth, philosophic attainments.

Here, therefore, must surely have been some great, some fatal mistake. There has indeed been a material defect in our mode of procedure, in the employment of this method of reasoning as an inlet to truth. The

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inlet to

fact

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fast is, that philosophers have totally mistaken the road of discovery, and have pretended to set out in their investigation from the very point where this journey should have terminated.

72
But the
art of com-
municating
knowledge

The Aristotelian logic, the syllogistic art, that art so much boasted of as the only inlet to true knowledge, the only means of discovery, is in direct opposition to the ordinary procedure of nature, by which we every day, and in every action of our lives, acquire knowledge and discover truth. It is not the art of discovering truth, it is the art of communicating knowledge, and of detecting error: it is nothing more than the application of this maxim, "whatever is true of a whole class of objects, is true of each individual of that class." This is not a just account of the art of discovering truth, nor is it a complete account of the art of reasoning. Reasoning is the producing belief; and whatever mode of argumentation invariably and infallibly produces belief, is reasoning. The ancient logic supposes that all the first principles are already known, and that nothing is wanted but the application of them to particular facts. But were this true, the application of them, as we have already observed, can hardly be called a discovery: but it is not true; and the fact is, that the first principles are generally the chief objects of our research, and that they have come into view only now and then as it were by accident, and never by the labour of the logician. He indeed can tell us whether we have been mistaken; for if our general principle be true, it must influence every particular case. If, therefore, it be false in any one of these, it is not a true principle. And it is here that we discover the source of that fluctuation which is so much complained of in philosophy. The authors of systems give a set of contradictory propositions logically deduced from a first principle, which has been hitherto adopted, and has no foundation in nature. This does not hinder the amusement of framing a system from it, nor this system from pleasing by its symmetry; and it takes a run: but when some officious follower thinks of making some use of it, which requires the comparison with experience and observation, they are found totally unlike, and the whole fabric must be abandoned as unsound: and thus the successive systems were continually pushing out their predecessors, and presiding not with the same treatment.

How was this to be remedied? The ratiocination was seldom egregiously wrong: the syllogistic art had ere now attained a degree of perfection which left little room for improvement, and was so familiarly understood by the philosophical practitioners, that they seldom committed any great blunders. Must we examine the first principle? This was a task quite new in science; and there were hardly any rules in the received systems of logic to direct us to the successful performance of it. Aristotle, the sagacious inventor of those rules, had not totally omitted it; but in the fervour of philosophic speculation he had made little use of them. His fertile genius never was at a loss for first principles, which answered the purpose of verbal disquisition without much risk of being misled on account of its dissimilitude to nature; for there was frequently no prototype with which his system or doctrine could be compared. His enthusiastic followers

found abundant amusement in following his example; and philosophy, no longer in the hands of men acquainted with the world, conversant in the great book of nature, was now confined almost entirely to recluse monks, equally ignorant of men and of things. But curiosity was awakened, and the men of genius were fretted as well as disgusted with the disquisitions of the schools, which one moment raised expectations by the symmetry of composition, and the next moment baffled them by their inconsistency with experience.

They saw that the left way was to begin *de novo*, to throw away the first principles altogether, without exception or examination, and endeavour to find out new ones, which should stand the test of logic; that is, should in every case be agreeable to fact.

Philosophers began to reflect, that under the unimproved tuition of kind nature we have acquired much useful knowledge. It is therefore highly probable, that her method is the most proper for acquiring knowledge, and that by imitating her manner we shall have the like success. We are too apt to flight the occupations of children, whom we may observe continually busy turning every thing over and over, putting them into every situation, and at every distance. We excuse it, saying that it is an innocent amusement; but we should try with an ingenious philosopher (Dr Reid), that they are most seriously and rationally employed: they are acquiring the habits of observation; and by merely indulging an undetermined curiosity, they are making themselves acquainted with surrounding objects: they are struck by similitudes, and amused with mere classification. If some new effect occurs from any of their little plays, they are eager to repeat it. When a child has for the first time tumbled a spoon from the table, and is pleased with its jingling noise on the floor, if another lies within its reach, it is sure to share the same fate. If the child is indulged in this diversion, it will repeat it with a greediness that deserves our attention. The very first eager repetition shows a confidence in the constancy of natural operations, which we can hardly ascribe wholly to experience; and its keenness to repeat the experiment, shows the interest which it takes in the exercise of this most useful propensity. It is beginning the study of nature; and its occupation is the same with that of a Newton computing the motions of the moon by his sublime theory, and comparing his calculus with observation. The child and the philosopher are equally employed in the contemplation of a similarity of event, and are anxious that this similarity shall return. The child, it is true, thinks not of this abstract object of contemplation, but throws down the spoon again to have the pleasure of hearing it jingle. The philosopher suspects that the conjunction of events is the consequence of a general law of nature, and tries an experiment where this conjunction recurs. The child is happy, and eager to enjoy a pleasure which to us appears highly frivolous; but it has the same foundation with the pleasure of the philosopher, who rejoices in the success of his experiment: and the fact, to merely a trifle to both, now acquires importance. Both go on repeating the experiment, till the fact ceases to be a novelty to either: the child is fatigued,

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The new
method of
discovery
by nature.

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and the philosopher has now established a new law of nature.

Such (says this amiable philosopher) is the education of kind nature, who from the beginning to the end of our lives makes the play of her scholars their most instructive lessons, and has implanted in our mind the curiosity and the inductive propensity by which we are enabled and disposed to learn them. The exercise of this inductive principle, by which nature prompts us to infer general laws from the observation of particular facts, gives us a species of logic new in the schools, but old as human nature. It is certainly a method of discovery; for by these means general principles, formerly unknown, have come into view.

74
Is a just
logic.

It is a just and rational logic; for it is founded on, and indeed is only the habitual application of, this maxim, "That whatever is true with respect to every individual of a class of events, is true of the whole class." This is just the inverse of the maxim on which the Aristotelian logic wholly proceeds, and is of equal authority in the court of reason. Indeed the expression of the general law is only the abbreviated expression of every particular instance.

This new logic, therefore, or the logic of induction, must not be considered as subordinate to the old, or founded on it. See *Logic*, Part III. chap. 5. In fact, the use and legitimacy of the Aristotelian logic is founded on the inductive,

All animals are mortal;

All men are animals: therefore

All men are mortal

This is no argument to any person who chooses to deny the mortality of man: even although he acknowledges his animal nature, he will deny the major proposition.

It is beside our purpose to show, how a point so general, so congenial to man, and so familiar, remained so long unnoticed, although the disquisition is curious and satisfactory. It was not till within these two centuries that the increasing demand for practical knowledge, particularly in the arts, made inquisitive men see how useless and insufficient was the learning of the schools in any road of investigation which was connected with life and business; and observe, that society had received useful information chiefly from persons actually engaged in the arts which the speculatists were endeavouring to illustrate; and that this knowledge consisted chiefly of experiments and observations, the only contributions which their authors could make to science.

The *Novum-Organum* of Bacon, which points out the true method of forming a body of real and useful knowledge, namely, the study of nature in the way of description, observation, and experiment, is undoubtedly the noblest present that science ever received. It may be considered as the grammar of nature's language, and is a counter-part to the logic of Aristotle; not exploding it, but making it effectual.

75
Its chief
rule

As the logic of Aristotle had its rules, so has the Baconian or inductive; and this work, the *Novum Organum Scientiarum*, contains them all. The chief rule, and indeed the rule from which all the rest are but derivations, is, that "the induction of particulars must be carried as far as the general affirmation which

is deduced from them." If this be not attended to, the mind of man, which from his earliest years shows great eagerness in searching for first principles, will frequently ascribe to the operation of a general principle events which are merely accidental. Hence the popular belief in omens, palmistry, and all kinds of fortune-telling.

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Bacon's
Philosophy.
76
For disco-
vering ge-
neral prin-
ciples,

This rule must evidently give a new turn to the whole track of philosophical investigation. In order to discover first principles, we must make extensive and accurate observations, so as to have copious inductions of facts, that we may not be deceived as to the extent of the principle inferred from them. We must extend our acquaintance with the phenomena, paying a minute attention to what is going on all around us; and we must study nature, not shut up in our closet drawing the picture from our own fancy, but in the world, copying our lines from her own features.

To delineate human nature, we must see how men act. To give the philosophy of the material world, we must notice its phenomena.

This method of studying nature has been prosecuted during these two last centuries with great eagerness and success. Philosophers have been busy in making accurate observations of facts, and copious collections of them. Men of genius have discovered points of resemblance, from which they have been able to infer many general powers both of mind and body; and resemblances among these have suggested powers still more general.

By these efforts investigation became familiar; philosophers studied the rules of the art, and became more expert; hypotheses were banished, and nothing was admitted as a principle which was not inferred from the most copious induction. Conclusions from such principles became every day more conformable to experience. Mistakes sometimes happened; but recourse being had to more accurate observation or more copious induction, the mistakes were corrected. In the present study of nature, our steps are more slow, and hesitating and painful; our conclusions are more limited and modest, but our discoveries are more certain and progressive, and the results are more applicable to the purposes of life. This pre-eminence of modern philosophy over the ancient is seen in every path of inquiry. It was first remarkable in the study of the material world; and there it still continues to be most conspicuous. But it is no less to be seen in the later performances of philosophers in metaphysics, pneumatology, and ethics, where the mode of investigation by analysis and experiment has been greatly adopted; and we may add, that it is this juster view of the employment which has restored philosophers to the world, to society. They are no longer to be found only in the academies of the sophists and the cloisters of a convent, but in the discharge of public and private duty. A philosophic genius is a genius for observation as well as reflection, and he says, *Homo sum, humani a me nihil alienum puto*.

77
And recti-
fying mis-
takes.

After saying so much on the nature of the employment, and the mode of procedure, it requires no deep penetration to perceive the value of the philosophical character. If there is a propensity in the human mind

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Estimate of
the philoso-
phic char-
acter.

which

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Phil. of phy.

which distinguishes us from the inferior orders of sentient beings, without the least circumstance of interference, a propensity which alone may be taken for the characteristic of the species, and of which no trace is to be found in any other, it is disinterested intellectual curiosity, a love of discovery for its own sake, independent of all its advantages.

We think highly (and with great justice do we think so) of our rational powers; but we may carry this too far, as we do every ground of self-estimation. To every man who enjoys the cheering thought of living under the care of a wise Creator, this boasted prerogative will be viewed with more modesty and diffidence; and He has given us evident marks of the rank in which He esteems the rational powers of man. In no case that is of essential importance, of indispensable necessity, not only to our well-being but to our very existence, has He left man to the care of his reason alone; for in the first instance, He has given us reason

79
We should
think modestly
of our rational
powers.

To guide the helm, while passion blows the gale.

God has not trusted either the preservation of the individual or the continuance of the race to man's notions of the importance of the task, but has committed them to the surer guards of hunger and of sexual desire. In like manner, He has not left the improvement of his sollest work, the intellectual powers of the soul of man, to his own notions how important it is to his comfort that he be thoroughly acquainted with the objects around him. No: He has committed this also to the sure hand of curiosity: and He has made this so strong in a few superior souls, whom He has appointed to give light and knowledge to the whole species, as to abstract them from all other pursuits, and to engage them in intellectual research with an ardour which no attainment can ever quench, but, on the contrary, inflames it the more by every draught of knowledge.

80
Importance
of our in-
ductive
principles.

But what need words

To paint its power? For this the daring youth
Breaks from his weeping mother's fondling arms
In foreign climes to rove. The pensive sage,
Heedless of sleep, or midnight's hurtful vapour,
Hangs o'er the sickly taper.—Hence the scorn
Of all familiar prospects, though beheld
With transport once. Hence th' attentive gaze
Of young astonishment.
Such is the bounteous providence of Heaven,
In every breast implanting the desire
Of objects new and strange, to urge us on
With unremitting labour to attain
The sacred stores that wait the rip'ning soul
In Truth's exhaustless bosom. *Aikenfield.*

But human life is not a situation of continual necessity; this would ill suit the plans of its Beneficent Author: and it is from induction of phenomena totally opposite to this, and from such induction alone, that we have ever thought of a wise Creator. His wisdom appears only in His beneficence. Human life is a scene filled with enjoyment; and the soul of man is stored with propensities and powers which have pleasure, in direct terms, for their object. Another striking

distinction of our nature is a continual disposition to refinement, of which few traces are to be found in the actions of other animals. There is hardly a gift of nature so grateful in itself as to please the freakish mind of man till he has moulded it to his fancy. Not contented with food, with raiment, and with shelter, he must have nice cooking, ornamental dress, and elegant houses. He hunts when he is not hungry, and he refines sexual appetite into a most elegant passion. In like manner he has improved this anxious desire of the knowledge of the objects around him, so as to derive from them the means of subsistence and comfort, into the most elegant and pleasing of all gratifications, the accumulation of intellectual knowledge, independent of all consideration of its advantages. And as every man has a title to the enjoyment of such pleasures as he can attain without injuring his neighbour; so it is allowable to such as have got the means of intellectual improvement, without relinquishing the indispensable social duties, to push this advantage as far as it will go: and, in all ages and countries, it has been considered as forming the greatest distinction between men of early fortune and the poor, who must earn their subsistence by the sweat of their brow. The plebeian must learn to work, the gentleman must learn to think; and nothing can be a surer mark of a groveling soul than for a man of fortune to have an uncultivated mind.

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Bacon's
Philosophy.

81
Our dispo-
sition to
refinement

Let us then cherish to the utmost this distinguishing propensity of the human soul: but let us do even this like philosophers. Let us cultivate it as it is; as the handmaid to the arts and duties of life; as the guide to something yet more excellent. A character is not to be estimated from what the person knows, but from what he can perform. The accumulation of intellectual knowledge is too apt to create an inordinate appetite for it; and the man habituated to speculation is, like the miser, too apt to place that pleasure in the mere possession, which he ought to look for only or chiefly in the judicious use of his favourite object. Like the miser, too, his habits of hoarding up generally unfit him for the very enjoyment which at setting out he proposed to himself. Seldom do we find the man, who has devoted his life to scientific pursuits for their own sake, possessed of that superiority of mind which the active employ to good purpose in times of perplexity; and much seldomer do we find him possessed of that promptitude of apprehension, and that decision of purpose, which are necessary for passing through the difficult scenes of human life.

82
Ought to
be cher-
ished as far as
it is subser-
vient to the
duties of
life.

But we may use the good things of this life without abusing them; and by moderation here, as in all other pursuits, derive those solid advantages which philosophy is able to bestow. And these advantages are great. To enumerate and describe them would be to write a great volume. We may just take notice of one, which is an obvious consequence of that strict and simple view which we have given of the subject; and this is, a modest opinion of our attainments. Appearances are all that we know; causes are for ever hid from our view; the powers of our nature do not lead us so far. Let us therefore, without hesitation, relinquish all pursuits which have such things as ultimate principles for objects of examination. Let us attend to the foundations of things which it is our great business to explore.

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Limits of
our know-
ledge

View of
Philosophy

explains. Among these there is such a subordination as that of means to ends, and of instruments to an operation. All will acknowledge the absurdity of the project of viewing light with a microscope. It is equally absurd for us to examine the nature of knowledge, or truth, or infinite wisdom, by our intellectual powers. We have a wide field of accessible knowledge in the works of God; and one of the greatest advantages, and of the most sublime pleasures, which we can derive from the contemplation, is the view which a judicious philosophical research will most infallibly give us of a world, not consisting of a number of detached objects, connected only by the fleeting tie of co-existence, but an *universe*, a *system* of beings, all connected together by causation, with innumerable degrees of subordination and subserviency, and all co-operating in the production of one great and glorious purpose. The heart which has but a spark of sensibility must be warmed by such a prospect, must be pleased to find itself an important part of this stupendous machine; and cannot but adore the incomprehensible Artist who contrived, created, and directs the whole. Let us not listen, then, to the timid admonitions of theological ignorance, which shrinks with superstitious horror from the thoughts of accounting for every thing by the powers of nature, and considers these attempts as an approach to atheism. Philosophical disquisition will, on the contrary, exhibit these general laws of the universe, that wonderful concatenation and adjustment of every thing both material and intellectual, as the most striking instance of incomprehensible wisdom; which, by means so few and so simple, can produce effects which by their grandeur dazzle our imagination, and by their multiplicity elude

On
Philosophy
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all possibility of enumeration. Of all the obstacles which the weakness, the folly, or the sinful vanity of men, have thrown in the way of the theologian, there is none so fatal, so hostile to all his endeavours, as a cold and comfortless system of materialism, which the reasoning pride of man first engendered, which made a figure among a few speculatists in the last century, but was soon forgotten by the philosopher, really busy with the observation of nature and of nature's God. It has of late reared up its head, being now cherished by all who wish to get rid of the stings of remorse, as the only opinion compatible with the peace of the licentious and the sensual: for we may say to them as Henry IV. said to the Prince of Wales, "Thy wish was, father Henry, to that thought." In vain will the divine attempt to lay this devil with the metaphysical exorcisms of the schools; it is philosophy alone that can detect the cheat. Philosophy singles out the characteristic phenomena which distinguish every substance; and philosophy never will hesitate in saying that there is a set of phenomena which characterize mind and another which characterize body, and that these are *totally* different. Continually appealing to fact, to the phenomena, for our knowledge of every cause, we shall have no difficulty in deciding that thought, memory, volition, joy, hope, are not compatible attributes with bulk, weight, elasticity, fluidity. *Tuta sub agide Pallas*; philosophy will maintain the dignity of human nature, will detect the sophisms of the materialists, confute their arguments; and she alone will restore to the countenance of nature that ineffable beauty of which those would deprive her, who would take away the supreme Mind which shines from within, and gives life and expression to every feature.

View of
Reason's
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Natural Philosophy. See *NATURAL Philosophy*, *PHILOSOPHY*, and *PHYSICS*.

Experimental Philosophy. See *EXPERIMENTAL Philosophy*.

Moral Philosophy. See *MORAL Philosophy*.

PHILOSTORGIUS, an ecclesiastical historian of the 4th century, was born in Cappadocia, and wrote an abridgment of ecclesiastical history, in which he treats Athanasius with some severity. This work contains many curious and interesting particulars. The best edition is that of Henry de Valois in Greek and Latin. There is also attributed to him a book against Porphyry.

PHILOSTRATUS (Flavius), was an ancient Greek author. He wrote the *Life of Apollonius Tyanensis*, and some other things which have come down to our time. Eusebius against Hierocles calls him an Athenian, because he taught at Athens; but Eunapius and Suidas always speak of him as a Lemnian; and he hints, in his *Life of Apollonius*, that he used to be at Lemnos when he was young. He frequented the schools of the sophists; and he mentions his having heard Damianus of Ephesus, Proclus Naucratis, and Hippodromus of Larissa. This seems to prove that he lived in the reign of the emperor Severus, from 193 to 212, when those sophists flourished. He

P H I

became known afterwards to Severus's wife Julia Augusta, and was one of those learned men whom this philosophic empress had continually about her. It was by her command that he wrote the *Life of Apollonius Tyanensis*, as he relates himself in the same place where he informs us of his connections with that learned lady. Suidas and Hesychius say that he was a teacher of rhetoric, first at Athens and then at Rome, from the reign of Severus to that of Philippus, who obtained the empire in 244.

Philostatus's celebrated work is his *Life of Apollonius*; which has erroneously been attributed to Lucian, because it has been printed with some of that author's pieces. Philostatus endeavours, as Cyril observes, to represent Apollonius as a wonderful and extraordinary person; rather to be admired and adored as a god than to be considered as a mere man. Hence Eunapius, in the preface to his *Lives of the Sophists*, says that the proper title of that work would have been, *The Coming of a God to Men*; and Hierocles, in his book against the Christians which was called *Philostatus*, and which was refuted by Eusebius in a work still extant, among other things drew a comparison between Apollonius and Jesus Christ. It has always been supposed that Philostatus composed his work with a view to discredit the miracles and doctrines of our Lord,

Philos-
tratus.

Philostratus. by setting up other miracles and other doctrines against them, and this supposition may be true; but that Apollonius was really an impostor and magician may not be so certain. He may, for what we know, have been a wise and excellent person; and it is remarkable, that Eusebius, though he had the worst opinion of Philostratus's history, says nothing ill of Apollonius. He concluded that that history was written to oppose the history of Jesus; and the use which the ancient infidels made of it justifies his opinion; but he draws no information from it with regard to Apollonius. It would have been improper to have done so; since the sophistical and affected style of Philostratus, the sources from whence he owns his materials to have been drawn, and, above all, the absurdities and contradictions with which he abounds, plainly show his history to be nothing but a collection of fables, either invented or at least embellished by himself.

The works of Philostratus, however, have engaged the attention of critics of the first class. Grævius had intended to have given a correct edition of them, as appears from the preface of Meric Casaubon to a dissertation upon an intended edition of Homer, printed at London in 1638, 8vo. So had Bentley, who designed to add a new Latin version of his notes; and Fabricius says that he saw the first sheet of Bentley's edition printed at Leipzig in 1691. Both these designs were dropped. A very exact and beautiful edition was published at length at Leipzig, 1709, in folio, by Olearius, professor of the Greek and Latin tongues in that university; who has proved himself perfectly qualified for the work he undertook, and shown all the judgment, learning, and industry, that are required in an excellent editor.

See APOLLONIUS. At the end of Apollonius's Life there are 95 Letters which go under his name. They are not, however, believed to be his; the style of them being very affected, and like that of a sophist, while they bear in other respects all the marks of a forgery. Philostratus says that he saw a collection of Apollonius's Letters in Hadrian's library at Antium, but had not inserted them all among these. They are short, and have in them little else than moral sentences. The Lives of the Sophists contain many things which are to be met with nowhere else. The Heroics of Philostratus are only a dialogue between a vintner of Thracian Chersonesus and a Phœnician, in which the former draws characters of Homer's heroes, and represents several things differently from that poet; and this upon the faith of Protefilaus's ghost, who had lately visited his farm, which was not far from the tomb of this hero. Olearius conjectures, with much probability, that Philostratus's design in this dialogue was secretly to criticize some things in Homer, which he durst not do openly on account of the great veneration they paid to him, and for fear of the odium which Zonaras and others had incurred by censuring him too freely. The images are elegant descriptions and illustrations of some ancient paintings and other particulars relating to the fine arts: to which Olearius has subjoined the description of some statues by Callistratus; for the same reason that he subjoined Eusebius's book against Hierocles to the Life and Letters of Apollonius, namely, because the subjects of these respective works are related to each other. The last piece is a collection of

Philostratus's Letters; but some of these, though it is not easy to determine which, were written by a nephew to our Philostratus, of the same name, as were also the last eighteen in the book of images. This is the reason why the title runs not *Philostrati*, but *Philostratorum quæ supersunt omnia*.

There were many persons of the name of Philostratus among the ancients; and there were many other works of the Philostratus here recorded, but no others are extant besides those we have mentioned.

PHILOTTIS, a servant maid at Rome, saved her countrymen from destruction. After the siege of Rome by the Gauls, the Fidenates assembled an army, and marched against the capital, demanding all the wives and daughters in the city as the only conditions of peace. This demand astonished the senators; and when they refused to comply, Philottis advised them to send all their female slaves disguised in matrons's clothes, and she offered to march herself at the head. Her advice was followed; and when the Fidenates had feasted late in the evening, and were quite intoxicated and fallen asleep, Philottis lighted a torch as a signal for her countrymen to attack the enemy. The whole was successful; the Fidenates were conquered; and the senate, to reward the fidelity of the female slaves, permitted them to appear in the dress of the Roman matrons.

PHILOXENUS, an officer of Alexander, who received Cilicia at the general division of the provinces. — A son of Ptolemy, who was given to Pelopidas as an hostage. — A dithyrambic poet of Cythera. He enjoyed the favour of Dionysius tyrant of Sicily for some time, till he offended him by seducing one of his female singers. During his confinement Philoxenus composed an allegorical poem called *Cyclops*; in which he had delineated the character of the tyrant under the name of Polyphemus, and represented his mistress under the name of Galatza, and himself under that of Ulysses. The tyrant, who was fond of writing poetry, and of being applauded, removed Philoxenus from his dungeon; but the poet refused to purchase his liberty by saying things unworthy of himself, and applauding the wretched verses of Dionysius, and therefore he was sent to the quarries. Being set at liberty, he some time after was asked his opinion at a feast about some verses which Dionysius had just repeated, and which the courtiers had received with the greatest applause. Philoxenus gave no answer, but he ordered the guards that surrounded the tyrant's table to take him back to the quarries. Dionysius was pleased with his pleasantry and with his firmness, and immediately forgave him. Philoxenus died at Ephesus about 380 years before Christ.

PHILTER, or **PHILTRE**, (*Philtrum*), in pharmacy. &c. a strainer.

PHILTRE, is also used for a drug or preparation, which it is pretended will excite love. — The word is formed from the Greek *philein*, "I love," or *phileos*, "lover."

Philthers are distinguished into *true* and *false*, and were given by the Greeks and Romans to excite love. (See LOVE in medicine.) The spurious are spells or charms, supposed to have an effect beyond the ordinary laws of nature by some magic virtue; such are those said to be given by old women, witches, &c. — The true

Philyca
||
Phinehas.

philters are those supposed to work their effect by some natural and magnetical power. There are many grave authors who believe the reality of these philters, and allege matter of fact in confirmation of their sentiments: among the rest, Van Helmont, who says, that upon holding a certain herb in his hand for some time, and taking afterwards a little dog by the foot with the same hand, the dog followed him wherever he went, and quite deserted his former master; which he pretends to account for thus: The heat communicated to the herb, not coming alone, but animated by the emanations of the natural spirits, determines the herb towards the man, and identifies it to him: having then received this ferment, it attracts the spirit of the other object magnetically, and gives it an amorous motion.—But this is mere cant; and all philters, whatever facts may be alleged, are mere chimeras.

PHILYCA, in botany. See PHYLYCA.

PHILYRA (fab. hist.), was one of the Oceanides, whom Saturn met in Thrace. The god, to escape from the vigilance of Rhea, changed himself into a horse, to enjoy the company of Philyra, by whom he had a son half a man and half a horse, called *Chiron*. Philyra was so ashamed of giving birth to such a monster, that she entreated the gods to change her nature. She was accordingly metamorphosed into a tree, called by her name among the Greeks.

PHIMOSIS, in medicine, a disorder of the penis, in which the prepuce is so strict or tense, that it cannot be drawn back over the glans. See SURGERY.

PHINEHAS, or, as the Jews pronounce it, PINCHAS, was the son of Eleazar, and grandson of Aaron. He was the third high priest of the Jews, and discharged this office from the year of the world 2571, till towards the year 2590. He is particularly commended in Scripture for the zeal he showed in vindicating the glory of God, when the Midianites had sent their daughters into the camp of Israel, to tempt the Hebrews to fornication and idolatry. For Zimri having publicly entered into the tent of a Midianitish woman named *Cozbi*, Phinehas arose up from among the people (Numb. xxv. 7, &c.), took a javelin in his hand, entered after Zimri into that infamous place, and stabbed both man and woman at one blow, in those parts that were chiefly concerned in this criminal commerce. Upon which the plague or distemper ceased with which the Lord had already begun to punish the Israelites. This happened in the year of the world, 2553.

Then the Lord said to Moses, Phinehas the son of Eleazar the high-priest has turned away my wrath from the children of Israel, because he has been zealous in my cause, and has hindered me from destroying them: wherefore acquaint him, that I give him my covenant of peace, and the priesthood shall be given to his posterity by a perpetual covenant, because he has been zealous for his God, and has made atonement for the crime of the children of Israel. This promise that the Lord made to Phinehas, to give him the priesthood by a perpetual covenant, interpreters observe, evidently included this tacit condition, that his children should continue faithful and obedient; since we know that the priesthood passed out of the family of Eleazar and Phinehas to that of Ithamar, and that it returned not to the posterity of Eleazar till after about 150 years.

This is what we find concerning the translation of

the high-priesthood from one family to the other. This dignity continued in the race of Phinehas, from Aaron down to the high-priest Eli, for about 335 years. See AARON.

The manner and causes of this change are unknown. It re-entered again into the family of Eleazar under the reign of Saul, when this prince having put to death Abimelech, and the other priests of Nob, gave the high-priesthood to Zadok, who was of the race of Phinehas. At the same time, David had Abiathar with him, of the race of Eli, who performed the functions of high-priest. So that after the death of Saul, David continued the priesthood to Zadok and Abiathar conjointly. But towards the end of David's reign, Abiathar having espoused the interest of Adonijah, to the prejudice of Solomon, he was in disgrace, and Zadok only was acknowledged as high-priest. The priesthood continued in his family till after the captivity of Babylon, and even to the destruction of the temple. But from the beginning of Zadok's priesthood alone, and the exclusion of Abiathar, to the ruin of the temple, is 1084 years.

We read of another memorable action of Phinehas, in which he still showed his zeal for the Lord. This was when the Israelites that were beyond Jordan had raised upon the banks of this river a vast heap of earth (Josh. xii. 30, 31). Those on the other side fearing they were going to forsake the Lord, and set up another religion, deputed Phinehas and other chief men among them, to go and inform themselves of the reason of erecting this monument. But when they had found that it was in commemoration of their union and common original, Phinehas took occasion from thence to praise the Lord, saying, "We know that the Lord is with us, since you are not guilty of that prevarication we suspected you were."

We do not exactly know the time of the death of Phinehas. But as he lived after the death of Joshua, and before the first servitude under Chushan-rishathaim, during the time that there were neither kings nor judges in the land, and every one did what was right in his own eyes (Judges xvii. 6. xviii. 1. xxi. 24.); his death is put about the year of the world 2590. It was under his pontificate that the story of Micah happened, as also that of the tribe of Dan, when they made a conquest of Laish; and the enormity that was committed upon the wife of the Levite of the mountain of Ephraim (Judges xx. 28.). Phinehas's successor in the high-priesthood was Abiezzer, or Abishuah.

The Rabbins allow a very long life to Phinehas. There are some who believe he lived to the time of the high-priest Eli, or even to the time of Samson. Others will have it, that he was the same as Eli, or rather as the prophet Elias, which would still prolong his life for several ages.

PHINEUS (fab. hist.), was a son of Agenor, king of Phœnicia, or according to some of Neptune. He became king of Thrace, or, according to the greater part of mythologists, of Bithynia. He married Cleopatra the daughter of Boreas, called by some *Cleobula*, by whom he had Plexippus and Pandion. After her death, he married Idæa the daughter of Dardanus. Idæa, jealous of his former wife's children, accused them of attempts upon their father's life and crown, or, as others assert, of attempts upon her virtue; on which they were condemned by

Phinehas,
Phineus.

Phlebotomy
||
Phlegon.

Phineus to be deprived of their eyes. This cruelty was soon after punished by the gods; for Phineus suddenly became blind, and the Harpies were sent by Jupiter to keep him in continual alarm, and to spoil the meats which were placed on his table. He was afterwards delivered from these dangerous monsters by his brothers-in-law Zetes and Calais, who pursued them as far as the Strophades. He likewise recovered his sight by means of the Argonauts, whom he had received with great hospitality, and whom he instructed in the easiest and speediest way of arriving in Colchis. The causes of the blindness of Phineus are a matter of dispute among the ancients; some supposing that this was inflicted by Boreas for his cruelty to his grandson; while others attribute it to the anger of Neptune, because he had directed the sons of Phryxus how to escape from Colchis to Greece. Many, however, imagine that it proceeded from his having rashly attempted to develope futurity; while others assert that Zetes and Calais put out his eyes on account of his cruelty to their nephews. The second wife of Phineus is called by some *Dia*, *Eurytia*, *Danae*, and *Idothea*.—He was killed by Hercules.

PHLEBOTOMY, the opening of a vein with a proper sharp-edged and pointed instrument, in order to let out a certain quantity of blood either for the preservation or recovery of a person's health. See **SURGERY**.

PHLEGM, in the animal economy, one of the four humours whereof the ancients supposed the blood to be composed. The chemists make phlegm or water an elementary body; the characters of which are fluidity, insipidity, and volatility.

PHLEGMAGOGUES, in medicine, a term anciently made use of for such medicines as were supposed to be endowed with the property of purging off phlegm; such as hermodactyls, agaric, turbith, jalap, &c.

PHLEGMATIC, among physicians, an appellation given to that habit or temperament of body wherein phlegm is predominant; which gives rise to catarrhs, coughs, &c.

PHLEGMON, denotes an external inflammation and tumor, attended with a burning heat.

PHLEGON, who was surnamed *Trallianus*, was born in Trallis a city of Lydia. He was the emperor Hadrian's freed man, and lived to the 18th year of Antoninus Pius; as is evident from his mentioning the consuls of that year. He wrote several works of great erudition, of which we have nothing left but fragments. Among these was a History of the Olympiads, A Treatise of Long-lived Persons, and another of Wonderful Things; the short and broken remains of which Xylander translated into Latin, and published at Basil in 1568, with the Greek and with notes. Meursius published a new edition of them with his notes at Leyden, in 1622. The titles of part of the rest of Phlegon's writings are preserved by Suidas. It is supposed that the History of Hadrian, published under Phlegon's name, was written by Hadrian himself, from this passage of Spartianus: "Hadrian thirsted so much after fame (says he), that he gave the books of his own life, drawn up by himself, to his freedmen, commanding them to publish those books under their own names; for we are told that Hadrian wrote Phlegon's books."

Phlegon's name has been more familiar among the

moderns, and his fragments have had a greater degree of regard paid to them than perhaps they deserve, merely because he has been supposed to speak of the darkness which prevailed during our Lord's passion. The book in which the words are contained is lost; but Eusebius has preserved them in his *Chronicon*. They are these: "In the 4th year of the 202d Olympiad, there was a greater and more remarkable eclipse of the sun than any that had ever happened before: for at the sixth hour the day was so turned into the darkness of night, that the very stars in the firmament were visible; and there was an earthquake in Bithynia which threw down many houses in the city of Nicæa." Eusebius thinks that these words of Phlegon related to the prodigies which accompanied Christ's crucifixion; and many other fathers of the church have thought the same: but this opinion is liable to many difficulties; for no man had ever a stronger desire than Phlegon to compile marvellous events, and to observe the supernatural circumstances in them. How was it then possible that a man of this turn of mind should not have taken notice of the most surprising circumstance in the eclipse which it is imagined he hints at, viz. its happening on the day when the moon was at the full? But had Phlegon done this, Eusebius would not have omitted it; and Origen would not have said that Phlegon had omitted this particular.

It was a matter of controversy some time ago, whether Phlegon really spoke of the darkness at the time of our Lord's passion; and many dissertations were written on both sides of the question. This dispute was occasioned by the above passage from Phlegon being left out in an edition of Clarke's Boyle's Lectures, published after his death, at the instance of Sykes, who had suggested to Clarke, that an undue stress had been laid upon it. Whiston, who informs us of this affair, expresses great displeasure against Sykes, and calls "the suggestion groundless." Upon this, Sykes published "A Dissertation on the Eclipse mentioned by Phlegon: or, An Inquiry whether that Eclipse had any relation to the darkness which happened at our Saviour's Passion, 1732," 8vo. Sykes concludes it to be most probable that Phlegon had in view a natural eclipse which happened November 24. in the 1st year of the 202d Olympiad, and not in the 4th year of the Olympiad in which Christ was crucified. Many pieces were written against him, and to some of them he replied; but perhaps it is a controversy which concerns the learned world merely, since the cause of religion is but little affected by it.

Photius blames Phlegon for expatiating too much on trifles, and for collecting too great a number of answers pronounced by the oracles. "His style (he tells us) is not altogether flat and mean, nor does it everywhere imitate the Attic manner of writing. But otherwise, the over nice accuracy and care with which he computes the Olympiads, and relates the names of the contests, the transactions, and even oracles, is not only very tiresome to the reader, whereby a cloud is thrown over all other particulars in that book, but the diction is thereby rendered unpleasant and ungrateful; and indeed he is every moment bringing in the answers pronounced by all kinds of deities."

PHLOGISTON, a term used by chemists to express a principle which was supposed to enter the composition of various bodies.

Phlogiston.

The bodies which were thought to contain it in the largest quantity are the inflammable substances; and the property which these substances possess of being susceptible of inflammation was thought to depend on this principle; and hence it was sometimes called the *Principle of Inflammability*. Inflammation, according to this doctrine, was the separation of this principle or phlogiston from the other matter which composed the combustible body. As its separation was always attended with the emission of light and heat, some of the chemists concluded that it was light and heat combined with other matter in a peculiar manner, or that it was some highly elastic and very subtle matter, on certain modifications of which heat and light depended.

Another class of bodies which were supposed to contain phlogiston are the metals; and the chemists supposed that the peculiar lustre of the metals depended on this principle. Of this they thought themselves convinced by the evidence of their senses in two ways; viz. first, because by exposing a metal to the action of a long continued heat, it lost its metallic lustre, and was converted into an earthy-like substance called *calx metallicus*; and secondly, because by mixing this calx with any inflammable substance whatever, and subjecting the mixture to certain operations, the inflammable matter disappeared, and the metal was restored to its former state and lustre, without suffering much diminution in quantity, especially if the processes had been conducted with care and attention.

This fact relative to the metals was thought to be a full demonstration of itself, independent of other proofs which were brought to support the doctrine. These were, that a combustible body, by the act of inflammation (i.e. by the dissipation of its phlogiston in the form of heat and light), was converted into a body that was no longer combustible, but which might have its property of combustibility restored to it again by mixing the incombustible remains with any kind of inflammable matter, and submitting the mixture to certain processes. In this way the body was restored to its former state of inflammability.

They were also at some pains to prove that the phlogiston or the principle of inflammability was the same in all inflammable bodies and in the metals. This identity of phlogiston they thought to be evident from the fact, that the calx of a metal might be restored to its metallic state, or that the remains after the combustion of a combustible body might be again restored to its original state of combustibility by the addition of any inflammable body whatever, taken either from the animal, vegetable, or mineral kingdoms.

These and several other facts were brought to prove, not only the existence of phlogiston, but its effects in mixture with other substances; and the objections which were made against the doctrine were removed with wonderful ingenuity. The chief objection against it was, that if the inflammation of a combustible body, or the conversion of a metal into calx, depends on the dissipation or extrication of phlogiston; then it must follow, that the remains of a combustible body after inflammation, and the calx of the metal, must be less than the matter from which they were produced: but this is contrary to fact; for when we collect with care all the vapour into which the purest inflammable bodies are converted by combustion, these incombustible

remains are much heavier than the inflammable body Phlogiston, was from which they were produced, and the calx into which a metal is converted by long exposure to the action of heat is heavier than the metal from which it was produced. This consideration made several people doubt of the truth of the doctrine; but the objection was removed by saying, that phlogiston was so subtle, as not only to have no weight, but to possess an absolute levity; and that when it was taken from an absolutely heavy body, that body must, by losing so much absolute levity, become heavier, in the same manner as the algebraists say, that a positive quantity is augmented by the subtraction of a negative quantity. This sophism satisfied the minds of most of the chemists, especially those who were algebraists.

The opinion that phlogiston was heat and light somehow combined with other matter, was proved, not only by the fact, that heat and light were emitted from a combustible body during its combustion, but from the reduction of certain metallic calces to their original metallic state again, at least in some degree, by simple exposure to heat and light. The white calx of silver for instance, when exposed in close sealed glass vessels to the light and heat of the sun, resumes a black tinge, and is in part restored to its metallic lustre without any addition whatever; but then this restoration, like the others above mentioned, is attended with a loss of weight.

Besides constituting the principal part of inflammable bodies and metals, phlogiston was thought to be the cause of colour in all vegetable and animal substances. This was concluded from the fact of plants growing white when defended from the action of the sun's rays, and in having their green colour restored by exposure to his rays again; and so far did the chemists suffer themselves to be deceived, that they actually thought the green colouring matter, which they extracted from fresh plants by certain chemical processes, to be an inflammable substance. A very material objection was made to this argument, viz. if plants owe their colour to phlogiston imparted by the sun's rays, why do the sun's rays destroy vegetable colours that are exposed to them? for we know that the sun's rays are very effectual in diminishing the lustre of cloth dyed with vegetable colours, and in bleaching or taking out various stains from linen and other substances. All this was removed by saying, that the sun's rays possessed different powers on living and on dead vegetable matter, and that the living vegetables had the power of absorbing phlogiston from the sun's rays, which dead vegetable matter had not.

Since the existence of phlogiston, as a chemical principle in the composition of certain bodies, is now fully proved to be false, we shall not trouble our readers with any farther observations on it, except adding, that although the chemists were satisfied with the proofs they gave of its reality, they were never able to exhibit it in a separate state, or show it in a pure form, unmixed with other matter.

Phlogiston seems to have been admitted as a principle in the composition of certain bodies, and to have been supposed the cause of certain modifications of matter, merely with a view to explain some of those natural phenomena which the authors of it were unable to explain on other principles. Subsequent discoveries in natural philosophy and in chemistry have repre-

phlogiston. represented things in a very different light from that in which the old chemists viewed them. The old chemists knew nothing but chemistry; they seldom extended their views to the observation of objects beyond their laboratories, and it was not till philosophers became chemists, and chemists philosophers, that chemistry began to wear the garb of science. The epoch in which this change began was in the time of Lord Verulam, who first removed the dimness from the chemist's eyes, and to him succeeded the Honourable Mr Boyle. Sir Isaac Newton, with the little assistance which his predecessors in this branch of science afforded him, is in reality the first who established chemistry on scientific ground. It must, however, be acknowledged, that although he made a great progress, he left much undone; and subsequent chemists, who were less accurate observers of nature, admitted principles unwarrantably. From the time of Sir Isaac Newton till the middle of the 18th century, no real improvement was made in scientific chemistry; and the progress this science has made since that period is owing to the important discovery of the existence of heat in a state of composition with other matter. Heat thus combined loses its activity or becomes insensible, just in the same way as any other active substance loses its apparent qualities in composition. Acids, for example, when combined in a certain proportion with substances for which they have strong attraction, as alkalis or absorbent earths, lose all their obvious acid qualities, and the compound turns out mild, and totally conceals the acid which it contains. In a similar manner, heat, when combined in certain proportions with other matter, loses its sensible qualities, and the compound conceals the heat which it contains. Heat, in this combined state, was called by its ingenious discoverer, Dr Black, *latent heat*, and it was found to be very abundant in the atmosphere, which owes its existence as an elastic fluid to the quantity of latent heat that it contains. After this discovery was made, Dr Crawford, considering that air was absorbed by a burning body, concluded that the heat which appears in the combustion of a combustible body, is the heat that had before existed in the air which was consumed by the burning body. Mr Lavoisier and others, prosecuting this inquiry, found that the combustible body, while it is burning, unites with the basis of the air, and that the heat which the air contained, and which was the cause of the air existing in the state of air, is expelled. This absorption of the basis of the air by the burning body, and the reduction of this basis to a solid form, accounts for the increase of weight which a body acquires by burning; or, in other words, gives a reason why the matter into which a combustible body is converted by combustion, is heavier than the body from which it was produced. The same absorption of air is observable, when a metal is converted into a calx, and the additional weight of the calx is found to be precisely equal to the weight of the air absorbed during the calcination. On these principles, therefore, we now explain the phenomena in a much more satisfactory manner than by the supposition of phlogiston, or a principle of inflammability.

This theory is more fully elucidated in several articles in the former part of this work; we shall not, therefore, in this place, repeat what the reader may

find under the words *HEAT, INFLAMMATION, FLAME, CHEMISTRY, CALCINATION of Metals, OXYGEN, &c.* Phlogiston, Phlogis.

PHLOGONIAE, a class of compound, inflammable, and metallic fossils, found in small masses of determinately angular figures; comprehending the pyricubia, pyroctogonia, and pyripolygonia.

PHLOMIS, the *SAGE-TREE*, or *Jerusalem Sage*; a genus of the gymnospermia order, belonging to the didynamia class of plants. There are 14 species, all of which have perennial roots, and of many the stalks also are perennial. The latter rise from two to five or six feet high; and are adorned with yellow, blue, or purple flowers in whorls. They are all ornamental plants; and deserve a place in gardens, as they are sufficiently hardy to endure the ordinary winters in this climate: they require, however, a pretty warm situation.

There are two species of this plant, which are peculiarly adapted to the shrubbery, viz the *Phlomis fruticosa*, a native of Spain and Sicily, and the *Phlomis purpurea*. Of the first species there are three varieties, 1. The *broad-leaved Jerusalem Sage-tree*, is now very common in our gardens. Its beauty is great, and its culture very easy. It grows to be about five feet high, and spreads its branches without order all around. The older branches are covered with a dirty, greenish, dead, falling, ill-looking bark; and this is the worst property of this shrub: but the younger shoots are white and beautiful; they are four-cornered, woolly, and soft to the touch. The leaves are roundish and oblong, and moderately large; and these grow opposite at the joints of the shrub on long footstalks. They are hoary to a degree of whiteness, and their footstalks also are woolly, white, tough, and strong. The flowers are produced in June, July, and August, at the top joints of the young shoots, in large whorled bunches. They are of the labiated kind, each consisting of two lips, the upper end of which is forked, and bends over the other. A finer yellow can hardly be conceived than the colour of which they are possessed; and being large, they exhibit their golden flowers at a great distance, causing thereby a handsome show. 2. The *narrow leaved Jerusalem Sage tree*, is of lower growth than the other, seldom rising higher than a yard or four feet. This shrub is in every respect like the other; only the shoots seem to have a more upright tendency of growth. The leaves also, which are narrower, are more inclined to a lanceolate form: They are numerous in both the sorts, and hide the deformity of the bark on the older stems, which renders them less exceptionable on that account. In short, these sorts are qualified for shrubberies of all kinds, or to be set in borders of flower-gardens, where they will flower, and be exceeded even in that respect by very few shrubs. 3. *Cretan Sage-tree*, is still of lower growth than either of the former, seldom arising to a yard in height. The leaves are of the same white hoary nature; they are very broad, and stand on long footstalks. The flowers are also of a delightful yellow colour, very large, and grow in large whorls, which give the plant great beauty.

The second species, which is *Purple Phlomis* or *Portugal Sage*, is four feet high; the stalks are woolly, and send forth several angular branches, which are covered with a white bark. The leaves are spear-shaped,

Phlomis
||
Phoca.

ped, oblong, woolly underneath, crenated, and grow on short footstalks. The flowers are produced in whorls from the joints of the branches. They are of a deep purple colour, and have narrow involucre. They appear in June and July, but are not succeeded by ripe seeds in England. There is a variety of this species with iron-coloured flowers, and another with flowers of a bright purple.

There are some other shrubby sorts of phlomis, of great beauty; but these not only often lose their leaves, and even branches, from the first frost, but are frequently wholly destroyed, if it happens to be severe. They are low shrubs, very beautiful, and look well among perennial flowers, where they will not only class as to size with many of that sort, but, being rather tender, may with them have such extraordinary care as the owner may think proper to allow them.

The propagation of the above sorts is, as we have already hinted, very easy, and is accomplished either by layers or cuttings. 1. If a little earth be thrown upon the branches any time in the winter, they will strike root and be good plants by the autumn following, fit for any place. Thus easy is the culture by that method. 2. The cuttings will also grow, if planted any time of the year. Those planted in winter should be the woody shoots of the former summer: These may be set close in a shady border; and being watered in dry weather, will often grow. This shrub may be propagated by young slips also, in any of the summer months. These should be planted in a shady border, like sage, and well watered. If the border is not naturally shady, the beds must be hooped, and covered with matting in hot weather. Watering must be constantly afforded them; and with this care and management many of them will grow.

PHLOX, LYCHNIDEA, or *Bastard Lychnis*; a genus of the monogynia order, belonging to the pentandria class of plants. There are seven species, all of them natives of North America. They have perennial roots, from which arise herbaceous stalks from nine inches to two feet in height, adorned with tubulated flowers of a purple colour. They are propagated by offsets, and will bear the winters in this country. They require a moist rich soil, in which they thrive better and grow taller than in any other.

PHLYCTENÆ, in medicine, small eruptions on the skin.

PHOCA, in zoology, a genus of quadrupeds of the order of feræ. There are six parallel fore-teeth in the upper jaw, the outermost being larger; and four blunt, parallel, distinct, equal fore-teeth in the under jaw. There is but one dog-tooth, and five or six three-pointed grinders; and the hind feet are united so as to resemble a sheep's tail. There are a variety of species, the principal of which are,

1. The ursine, sea-bear, or ursine seal, has external ears. The male is greatly superior in size to the female. The bodies of each are of a conic form, very thick before, and taper to the tail. The length of a large one is

eight feet; the greatest circumference, five feet; near the tail, 20 inches; and the weight is about 800 lb. The nose projects like that of a pug-dog, but the head rises suddenly; the teeth lock into one another when the mouth is shut: the tongue is large; the eyes are large and prominent, and may be covered at pleasure by a fleshy membrane. The length of the fore-legs is 24 inches; they are like those of other quadrupeds, not immersed in the body like those of seals; the feet are formed with toes like those of other animals, but are covered with a naked skin, so that externally they seem to be a shapeless mass; the hind-legs are fixed to the body quite behind, like those of common seals; but are capable of being brought forward, so that the animal makes use of them to scratch its head.

These animals are found in the northern seas. They ^{Pennant's} are found in amazing quantities between Kamtschatka ^{Arctic Zoology} and America; but are scarcely known to land on the Asiatic shore: nor are they ever taken except in the three Kurilian islands, and from thence in the Bobrowie More, or Beaver Sea, as far as the Kronoski headland, off the river Kamtschatka, which comprehends only from 50 to 56 north latitude. It is observable that they never double the southern cape of the peninsula, or are found on the western side in the Penschinska sea: but their great resort has been observed to be to Bering's islands. They are as regularly migratory as birds of passage. They first appear off the three Kurili islands and Kamtschatka in the earliest spring. There is not one female which does not come pregnant. Such as are then taken are opened, the young taken out and skinned. They are found in Bering's island only on the western shore, being the part opposite to Asia, where they first appear on their migration from the south.

Ursine seals are also found in the southern hemisphere, even from under the line, in the isle of Gallipagos (A), to New Georgia, in south latitude 54. 15. and west longitude 37. 15. In the intermediate parts, they are met with in New Zealand, in the isle of Juan Fernandez, and its neighbour Massa Fuera, and probably along the coasts of Chili to Terra del Fuego and Staten Land. In Juan Fernandez, Staten Land, and New Georgia, they swarm; as they do at the northern extremity of this vast ocean. Those of the southern hemisphere have also their seasons of migration.—Alexander Selkirk, who passed three lonely years on the isle of Juan Fernandez, remarks that they come ashore in June, and stay till September. Captain Cook found them again in their place of remigration in equal abundance, on Staten Land and New Georgia in the months of December and January; and Don Pernety found them on the Falkland islands in the month of February. According to the Greenlanders, this species inhabits the southern parts of their country. They call it *Siuvekejak*. That it is very fierce, and tears to pieces whatsoever it meets; that it lives on land as well as in water, and is greatly dreaded by the hunters.

During the three months of summer they lead a most indolent

(A) *Woodes Roger's Voy.* 265. He says that they are neither so numerous there, nor is their fur so fine, as those on Juan Fernandez, which is said to be extremely soft and delicate.

Phoca. indolent life: they arrive at the islands vastly fat; but during that time they are scarce ever in motion, confine themselves for whole weeks to one spot, sleep a great part of the time, eat nothing, and, except the employment the females have in suckling their young, are totally inactive. They live in families: each male has from 8 to 50 females, whom he guards with the jealousy of an eastern monarch; and though they lie by thousands on the shores, each family keeps itself separate from the rest, and sometimes, with the young and unmarried ones, amount to 120. The old animals, which are destitute of females, or deserted by them, live apart, and are excessively splenetic, peevish, and quarrelsome: are exceeding fierce, and so attached to their old haunts, that they would die sooner than quit them. They are monstrously fat, and have a most hircine smell. If another approaches their station, they are roused from their indolence, and instantly snap at it, and a battle ensues; in the conflict, they perhaps intrude on the seat of another: this gives new cause of offence, so in the end the discord becomes universal, and is spread through the whole shore.

The other males are also very irascible: the causes of their disputes are generally these. The first and most terrible is, when an attempt is made by another to seduce one of their mistresses or a young female of the family. This insult produces a combat; and the conqueror is immediately followed by the whole seraglio, who are sure of deserting the unhappy vanquished. The second reason of a quarrel is, when one invades the seat of another: the third arises from their interfering in the disputes of others. These battles are very violent; the wounds they receive are very deep, and resemble the cuts of a sabre. At the end of a fight they fling themselves into the sea, to wash away the blood.

The males are very fond of their young, but very tyrannical towards the females; if any body attempts to take their cub, the male stands on the defensive, while the female makes off with the young in her mouth; should she drop it, the former instantly quits his enemy, falls on her, and beats her against the stones, till he leaves her for dead. As soon as she recovers, she comes in the most suppliant manner to the male, crawls to his feet, and washes them with her tears: he, in the mean time, stalks about in the most insulting manner; but in case the young one is carried off, he melts into the deepest affliction, and shows all signs of extreme concern. It is probable that he feels his misfortunes the more sensibly, as the female generally brings but one at a time, never more than two.

They swim very swiftly, at the rate of seven miles an hour. If wounded, they will seize on the boat, and carry it along with vast impetuosity, and oftentimes sink it. They can continue a long time under water. When they want to climb the rocks, they fasten with the fore-paws, and so draw themselves up. They are very tenacious of life, and will live for a fortnight after receiving such wounds as would immediately destroy any other animal.

Pennant, his. The Kamtschatkans take them by harpooning, for they never land on their shore. To the harpoon is fastened a long line, by which they draw the animal to the boat after it is spent with fatigue; but in the

chase, the hunters are very fearful of too near an approach, lest the animal should fasten on, and sink their vessel.

The uses of them are not great. The flesh of the old males is rank and nauseous; that of the females is said to resemble lamb; of the young ones roasted, a sucking pig. The skins of the young, cut out of the bellies of the dams, are esteemed for clothing, and are sold for about three shillings and fourpence each; those of the old for only four shillings.

Their remigration is in the month of September, when they depart excessively lean, and take their young with them. On their return, they again pass near the same parts of Kamtschatka which they did in the spring. Their winter retreats are quite unknown; it is probable that they are the islands between Kurili and Japan, of which we have some brief accounts, under the name of *Compagnie Land*, *Stater Land*, and *Jeso Gasima*, which were discovered by Martin Uriel in 1642. It is certain, that by his account the natives employed themselves in the capture of seals. Sailors do not give themselves the trouble of observing the nice distinction of specific marks; we are therefore at liberty to conjecture those which he saw to be our animals, especially as we can fix on no more convenient place for their winter quarters. They arrive along the shores of the Kurili islands, and part of those of Kamtschatka, from the south. They land and inhabit only the western side of Bering's isle which faces Kamtschatka; and when they return in September, their route is due south, pointing towards the discoveries of Uriel. Had they migrated from the south-east as well as the south-west, every isle, and every side of every isle, would have been filled with them; nor should we have found (as we do) such a constant and local residence.

2. The leonina, sea-lion, or bottlenose, is found near the south pole. One variety of this species is described at some length by the publisher of Anson's voyage. However, according to others who have written on this subject, the name of *sea-lion* belongs not so properly to this as to another, which has a mane like a true lion. Of these we have the following account from Pernety's Historical Journal. "The hair that covers the back part of the head, neck, and shoulders, is at least as long as the hair of a goat. It gives this amphibious animal an air of resemblance to the common lion of the forest, excepting the difference of size. The sea-lions of the kind I speak of are 25 feet in length, and from 19 to 20 in their greatest circumference. In other respects they resemble the common sea-lions. Those of the small kind have a head resembling a mastiff's, with close cropt ears.

"The teeth of the sea-lions which have manes, are much larger and more solid than those of the rest. In these, all the teeth which are inserted into the jaw-bone are hollow. They have only four large ones, two in the lower and two in the upper jaw. The rest are not even so large as those of a horse. I brought home one belonging to the true sea-lion, which is at least three inches in diameter, and seven in length, though not one of the largest. We counted 22 of the same sort in the jaw-bone of one of these lions, where five or six were wanting. They were entirely solid, and projected scarce more than an inch, or an inch and

Phoca. a half beyond their sockets. They are nearly equal in solidity to flint, and are of a dazzling white. Several of our seamen took them for white flints when they found them upon the shore. I could not even persuade them that they were not real flints, except by rubbing them against each other, or breaking some pieces off, to make them sensible that they exhaled the same smell as bones and ivory do when they are rubbed or scraped.

"These sea-lions that have manes are not more mischievous or formidable than the others. They are equally unwieldy and heavy in their motions; and are rather disposed to avoid than to fall upon those who attack them. Both kinds live upon fish and water-fowl, which they catch by surprise. They bring forth and suckle their young ones among the corn flags, where they retire at night, and continue to give them suck till they are large enough to go to sea. In the evening you see them assembling in herds upon the shore, and calling their dams in cries so much like lambs, calves, and goats, that, unless apprised of it, you would easily be deceived. The tongue of these animals is very good eating: we preferred it to that of an ox or calf. For a trial we cut off the tip of the tongue hanging out of the mouth of one of these lions which was just killed. About 16 or 18 of us eat each a pretty large piece, and we all thought it so good, that we regretted we could not cut more of it.

"It is said that their flesh is not absolutely disagreeable. I have not tasted it: but the oil which is extracted from their grease is of great use. This oil is extracted two ways; either by cutting the fat in pieces, and melting it in large cauldrons upon the fire; or by cutting it in the same manner upon hurdles, or pieces of board, and exposing them to the sun, or only to the air: this grease dissolves of itself, and runs into vessels placed underneath to receive it.—Some of our seamen pretended, that this last sort of oil, when it is fresh, is very good for kitchen uses: this, as well as the other, is commonly used for dressing leather for vessels, and for lamps. It is preferred to that of the whale: it is always clear, and leaves no sediment.

"The skins of the sea-lions are used chiefly in making portmanteaus, and in covering trunks. When they are tanned, they have a grain almost like Morocco. They are not so fine, but are less liable to tear, and keep fresh a longer time. They make good shoes and boots, which, when well seasoned, are water-proof.

"One day Mr Guyot and some others brought on board five sea lionesses. They were about seven feet long, and three and a half in circumference, tho' their intestines were drawn. These gentlemen had landed on a small island, where they found a prodigious number of these animals, and killed eight or nine hundred of them with sticks. No other weapon is necessary on these occasions. A single blow with a bludgeon, three feet or three feet and a half long, almost full at the nose of these animals, knocks them down, and kills them on the spot.

"This is not altogether the case with the males: their size is prodigious. Our gentlemen encountered two of them for a long time, with the same weapons, without being able to overcome them. They lodged

Phoca. three balls in the throat of one while he opened his mouth to defend himself, and three musket-shot in his body. The blood gushed from his wounds like wine from a tap. However, he crawled into the water and disappeared. A sailor attacked the other, and engaged him for a long time, striking him on the head with a bludgeon, without being able to knock him down: the sailor fell down very near his antagonist, but had the dexterity to recover himself at the instant the lion was going to gorge him. Had he once seized him, the man would infallibly have been lost: the animal would have carried him into the water as they usually do their prey, and there feasted upon him. In his retreat to the sea this animal seized a penguin, and devoured him instantaneously."

Mr Pennant describes three seals of different species, which are called *sea-lions*, viz. the *phoca leonina*, or hooded seal; the *phoca leonina*, or bottlenose; and the *bestia marina*, or leonine seal. He differs in some particulars from the author just quoted; and such of our readers as desire to know these differences, we refer to his works.

3. The vitulina, sea-calf, or common seal, inhabits the European ocean. It has a smooth head without external ears; and the common length is from five to six feet. The fore-legs are deeply immersed in the skin of the body: the hind-legs are placed in such a manner as to point directly backwards: every foot is divided into five toes; and each of those connected by a strong and broad web, covered on both sides with short hair. The toes are furnished with strong claws, well adapted to assist the animal in climbing the rocks it basks on: the claws on the hind-feet are slender and straight; except at the ends, which are a little incurvated. The head and nose are broad and flat, like those of the otter; the neck short and thick; the eyes large and black; in lieu of external ears, it has two small orifices: the nostrils are of long: on each side the nose are several long stiff hairs; and above each eye are a few of the same kind. The form of the tongue is so singular, that were other notes wanting, that alone would distinguish it from all other quadrupeds; being forked, or slit at the end. The cutting teeth are singular in respect to their number, being six in the upper jaw, and only four in the lower. It has two canine teeth above and below, and on each side of the jaw five grinders; the total 34. The whole animal is covered with short hair, very closely set together: the colour of that on the body is generally dusky, spotted irregularly with white; on the belly white: but seals vary greatly in their marks and colours, and some have been found entirely white.

The seal is common on most of the rocky shores of Great Britain and Ireland, especially on the northern coasts: in Wales, it frequents the coasts of Caernarvonshire and Anglesey. They inhabit all the European seas, even to the extreme north; are found far within the arctic circle, in the seas both of Europe and Asia, and are even continued to those of Kamtschatka*. It preys entirely on fish, and never molests the sea-fowl: for numbers of each are often seen floating on the waves, as if in company. Seals eat their prey beneath the water; and in case they are devouring any very oily fish, the place is known by a certain smoothness of the waves immediately above. The power

* *Steller*,
in *Nov.*
Com. Patrop.
ii. 290.

Phoca.

power of oil in stilling the waves excited by a storm is mentioned by Pliny: the moderns have made the experiment with success; and thereby made one advance towards eradicating the vulgar prejudices against that great and elegant writer.

Seals are excellent swimmers, and ready divers; and are very bold when in the sea, swimming carelessly enough about boats: their dens or lodgments are in hollow rocks or caverns near the sea, but out of the reach of the tide: in the summer they will come out of the water, to bask or sleep in the sun on the top of large stones or shivers of rocks; and that is the opportunity our countrymen take of shooting them: if they chance to escape, they hasten towards their proper element, flinging stones and dirt behind them as they scramble along; at the same time expressing their fears by piteous moans: but if they happen to be overtaken, they will make a vigorous defence with their feet and teeth till they are killed. They are taken for the sake of their skins, and for the oil their fat yields: the former sell for 4s. or 4s. 6d. a-piece; which, when dressed, are very useful in covering trunks, making waistcoats, shot-pouches, and several other conveniences. We remember some years ago to have seen a young seal in some degree domesticated. It was taken at a little distance from the sea, and was generally kept in a vessel full of salt water; but sometimes it was allowed to crawl about the house, and even to approach the fire. Its natural food was regularly procured for it, and it was taken to the sea every day and thrown in from a boat. It used to swim after the boat, and always allowed itself to be taken back. It lived thus for several weeks; and we doubt not would have lived much longer had it not been sometimes too roughly used by the boys who took it to and from the sea.

The flesh of these animals, and even of porpoises, formerly found a place at the tables of the great; as appears from the bill of fare of that vast feast that Archbishop Nevill gave in the reign of Edward IV. in which is seen that several were provided on the occasion. They couple about April, on large rocks or small islands not remote from the shore; and bring forth in those vast caverns that are frequent on our coasts: they commonly bring two at a time, which in their infant state are covered with a whitish down or woolly substance. The seal hunters in Caithness say, that their growth is so sudden, that in nine tides from their birth (108 hours) they will become as active as their parents. On the coast of that country are immense caverns opening into the sea, and running some hundreds of yards beneath the land. These are the resort of seals in the breeding time, where they continue till their young are old enough to go to sea, which is in about six or seven weeks. The first of these caves is near the Ord, the last near Thurmaster: their entrance is so narrow as only to admit a boat; their inside very spacious and lofty. In the month of October, or the beginning of November, the seal-hunters enter the mouth of the caverns about midnight, and rowing up as far as they can, they land; each of them being provided with a bludgeon, and properly stationed, they light their torches, and make a great noise, which brings down the seals from the farther end in a confused body with fearful shrieks and cries: at first the men are obliged to give way for fear of being overborne; but when

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the first crowd is past, they kill as many as straggle behind, chiefly the young, by striking them on the nose; a very slight blow on that part dispatches them. When the work is over, they drag the seals to the boat, which two men are left to guard. This is a most hazardous employment; for should their torches go out, or the wind blow hard from sea during their continuance in the cave, their lives are lost. The young seals of six weeks age yield more oil than their emaciated dams: above eight gallons have been got from a single whelp, which sells from 6d. to 9d. per gallon; the skins from 6d. to 1s. each.

The natural history of this animal may be further elucidated by the following extracts from a letter of the reverend Dr William Berkeley, dated October the 24th 1763. "The seals are seen in the greatest plenty on the shores of Cornwall in the months of May, June, and July. They are of different sizes; some as large as a cow, and from that downward to a small calf. They feed on most sorts of fish which they can master; and are seen searching for their prey near shore, where the whistling fish, wrasse, and pollocks, resort. They are very swift in their proper depth of water, dive like a shot, and in a trice rise at 50 yards distance; so that weaker fishes cannot avoid their tyranny except in shallow water. A person of the parish of Sennan saw not long since a seal in pursuit of a mullet (that strong and swift fish); the seal turned it to and fro in deep water, as a greyhound does a hare: the mullet at last found it had no way to escape, but by running into shoal water: the seal pursued; and the former, to get more surely out of danger, threw itself on its side, by which means it darted into shoaler water than it could have swam in with the depth of its paunch and fins, and so escaped. The seal brings her young about the beginning of autumn: our fishermen have seen two sucking their dam at the same time, as she stood in the sea in a perpendicular position. Their head in swimming is always above water, more so than that of a dog. They sleep on rocks surrounded by the sea, or on the less accessible parts of our cliffs left dry by the ebb of the tide; and if disturbed by any thing, take care to tumble over the rocks into the sea. They are extremely watchful, and never sleep long without moving; seldom longer than a minute; then raise their heads, and if they hear or see nothing more than ordinary, lie down again, and so on, raising their heads a little and reclining them alternately in about a minute's time. Nature seems to have given them this precaution, as being unprovided with auricles or external ears; and consequently not hearing very quick, nor from any great distance."

These animals are so very useful to the inhabitants of Greenland and other arctic people, that they may be called their flocks. We cannot give a better account of these uses than in the words of Mr Crantz, who was long resident in those northern regions.

"Seals (says he) are more needful to them than sheep are to us, though they furnish us with food and raiment; or than the cocoa-tree is to the Indians, although that presents them not only with meat to eat, and covering for their bodies, but also houses to dwell in, and boats to sail in, so that in case of necessity they could live solely from it. The seals flesh (together with the rein-deer, which is already grown pretty

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logy.

Phoca.

seal) supplies the natives with their most palatable and substantial food. Their fat furnishes them with oil for lamp-light, chamber and kitchen fire; and whoever sees their habitations, presently finds, that if they even had a superfluity of wood, it would not do, they can use nothing but train in them. They also mellow their dry food, mostly fish, in the train; and finally, they barter it for all kinds of necessaries with the factor. They can sew better with fibres of the seals sinews than with thread or silk. Of the skin of the entrails they make their windows, curtains for their tents, shirts, and part of the bladders they use at their harpoons; and they make train bottles of the raw. Formerly, for want of iron, they made all manner of instruments and working tools of their bones. Neither is the blood wasted, but boiled with other ingredients, and eaten as soup. Of the skin of the seal they stand in the greatest need; for, supposing the skins of rein-deer and birds would furnish them with competent clothing for their bodies, and coverings for their beds; and their flesh, together with fish, with sufficient food; and provided they could dress their meat with wood, and also new-model their house-keeping, so as to have light, and keep themselves warm with it too; yet without the sealskins they would not be in a capacity of acquiring these same rein deer, fowls, fishes, and wood; because they must cover over with seal-skin both their large and small boats in which they travel and seek their provision. They must also cut their thongs or straps out of them, make the bladders for their harpoons, and cover their tents with them; without which they could not subsist in summer.

"Therefore no man can pass for a right Greenlander who cannot catch seals. This is the ultimate end they aspire at, in all their device and labour from their childhood up. It is the only art (and in truth a difficult and dangerous one it is) to which they are trained from their infancy; by which they maintain themselves, make themselves agreeable to others, and become beneficial members of the community".

"The Greenlanders have three ways of catching seals: either singly, with the bladder; or in company, by the clapper-hunt; or in the winter on the ice: whereto may be added the shooting them with a gun.

"The principal and most common way is the taking them with the bladder. When the Greenlander sets out equipped, and spies a seal, he tries to surprise it unawares, with the wind and sun in his back, that he may not be heard or seen by it. He tries to conceal himself behind a wave, and makes hastily but softly up to it, till he comes within four, five, or six fathoms of it; meanwhile he takes the utmost care that the harpoon, line, and bladder, lie in proper order. Then he takes hold of the oar with his left hand, and the harpoon with his right by the hand-board, and so away he throws it at the seal, in such a manner that the whole dart flies from the hand-board and leaves that in his hand. If the harpoon hits the mark, and buries itself deeper than the bars, it will directly disengage itself from the bone joint, and that from the shaft; and also unwind the string from its lodge on the kajak. The moment the seal is pierced, the Greenlander must throw the bladder, tied to the end of the

string, into the water, on the same side as the seal runs and dives; for that he does instantly like a dart. Then the Greenlander goes and takes up the shaft swimming on the water, and lays it in its place. The seal often drags the bladder with it under water, tho' it is a considerable impediment, on account of its great bigness; but it so wearies itself out with it, that it must come up again in about a quarter of an hour to take breath. The Greenlander hastens to the spot where he sees the bladder rise up, and snatches the seal as soon as it appears with a great lance. This lance always comes out of its body again; but he throws it at the creature afresh every time it comes up till it is quite spent. Then he runs the little lance into it, and kills it outright, but stops up the wound directly to preserve the blood; and lastly, he blows it up, like a bladder, betwixt skin and flesh, to put it into a better capacity of swimming after him; for which purpose he fastens it to the left side of his kajak or boat.

"In this exercise the Greenlander is exposed to the most and greatest danger of his life; which is probably the reason that they call this hunt or fishery *kamavook*, i. e. "the extinction," viz. of life. For if the line should entangle itself, as it easily may, in its sudden and violent motion; or if it should catch hold of the kajak, or should wind itself round the oar, or the hand, or even the neck, as it sometimes does in windy weather; or if the seal should turn suddenly to the other side of the boat, it cannot be otherwise than that the kajak must be overturned by the string, and drawn down under water. On such desperate occasions the poor Greenlander stands in need of every possible art to disentangle himself from the string, and to raise himself up from under the water several times successively; for he will continually be overturning till he has quite disengaged himself from the line. Nay, when he imagines himself to be out of all danger, and comes too near the dying seal, it may still bite him in the face or hand; and a female seal that has young, instead of flying the field, will sometimes fly at the Greenlander in the most vehement rage, and do him a mischief, or bite a hole in his kajak that he must sink.

"In this way, singly, they can kill none but the careless stupid seal called *attarfoak*. Several in company must pursue the cautious *kassigiak* by the clapper-hunt. In the same manner they also surround and kill the *attarfoit* in great numbers at certain seasons of the year; for in autumn they retire into the creeks or inlets in stormy weather, as in the *Nepiset* sound in Bell's river, between the main land and the island *Kangek*, which is full two leagues long, but very narrow. There the Greenlanders cut off their retreat, and frighten them under water by shouting, clapping, and throwing stones; but as they must come up again continually to draw breath, then they persecute them again till they are tired, and at last are obliged to stay so long above water that they surround them, and kill them with a kind of dart for the purpose. During this hunt we have a fine opportunity to see the agility of the Greenlanders, or, if I may call it so, their huffar-like manœuvres. When the seal rises out of the water, they all fly upon it as if they had wings, with a desperate noise; the poor creature is forced to dive again directly; and the moment he does they dis-

Phoca.

Phoca. perse again as fast as they came, and every one gives heed to his post to see where it will start up again; which is an uncertain thing, and is commonly three quarters of a mile from the former spot. If a seal has a good broad water, three or four leagues each way, it can keep the sportsmen in play for a couple of hours before it is so spent that they can surround and kill it. If the seal in its fright betakes itself to the land for a retreat, it is welcomed with sticks and stones by the women and children, and presently pierced by the men in the rear. This is a very lively and a very profitable diversion for the Greenlanders, for many times one man will have eight or ten seals for his share.

"The third method of killing seals upon the ice is mostly practised in Disko, where the bays are frozen over in the winter. There are several ways of proceeding. The seals themselves make sometimes holes in the ice, where they come and draw breath; near such a hole a Greenlander seats himself on a stool, putting his feet on a lower one to keep them from the cold. Now when the seal comes and puts its nose to the hole, he pierces it instantly with his harpoon; then breaks the hole larger, and draws it out and kills it quite. Or a Greenlander lays himself upon his belly on a kind of a sledge, near other holes, where the seals come out upon the ice to bask themselves in the sun. Near this great hole they make a little one, and another Greenlander puts a harpoon into it with a very long shaft or pole. He that lies upon the ice looks into the great hole, till he sees a seal coming under the harpoon; then he gives the other the signal, who runs the seal through with all his might.

"If the Greenlander sees a seal lying near its hole upon the ice, he slides along upon his belly towards it, wags his head, and grunts like a seal; and the poor seal, thinking it is one of its innocent companions, lets him come near enough to pierce it with his long dart. When the current wears a great hole in the ice in the spring, the Greenlanders plant themselves all round it, till the seals come in droves to the brim to fetch breath, and then they kill them with their harpoons. Many also are killed on the ice while they lie sleeping and basking in the sun."

To this long quotation, which we think both curious and interesting, we shall subjoin the following observations of Mr Pennant, which are not less worthy of attention.

"Nature (says this intelligent writer) has been so niggardly in providing variety of provision for the Greenlanders, that they are necessitated to have recourse to such which is offered to them with a liberal hand. The Kamtschatkan nations, which enjoy several animals, as well as a great and abundant choice of fish, are so enamoured with the taste of the fat of seals, that they can make no feast without making it one of the dishes. Of that both Russians and Kamtschatkans make their candles. The latter eat the flesh boiled, or else dried in the sun. If they have a great quantity, they preserve it in the following manner:

"They dig a pit of a requisite depth, and pave it with stones; then fill it with wood, and set it on fire so as to heat the pit to the warmth of a stove. They then collect all the cinders into a heap. They strew the bottom with the green wood of alder, on which they place separately the flesh and the fat, and put

between every layer branches of the same tree; when the pit is filled they cover it with soils, so that the vapour cannot escape. After some hours they take out both fat and flesh, and keep it for winter's provisions, and they may be preserved a whole year without spoiling.

"The Kamtschatkans have a most singular ceremony. After they take the flesh from the heads of the seals, they bring a vessel in form of a canoe, and sling into it all the skulls, crowned with certain herbs, and place them on the ground. A certain person enters the habitation with a sack filled with *tonchitché*, sweet herbs, and a little of the bark of willow. Two of the natives then roll a great stone towards the door, and cover it with pebbles; two others take the sweet herbs and dispose them, tied in little packets. The great stone is to signify the sea shore, the pebbles the waves, and the packets fish. They then bring three dishes of a hash called *tolkouchas* of this they make little balls, in the middle of which they stick the packets of herbs: of the willow-bark they make a little canoe, and fill it with *tolkoucha*, and cover it with the sack. After some time the two Kamtschatkans, who had put the mimic seals into the *tolkouchas*, take the balls, and a vessel resembling a canoe, and draw it along the sand as if it was on the sea, to convince the real seals how agreeable it would be to them to come among the Kamtschatkans, who have a sea in their very juts or dwellings. And this they imagine will induce the seals to suffer themselves to be taken in great numbers. Various other ceremonies, equally ridiculous, are practised; in one of which they invoke the winds, which drive the seals on their shores, to be propitious.

"Besides the uses which are made of the flesh and fat of seals, the skins of the largest are cut into soles for shoes. The women make their summer boots of the undressed skins, and wear them with the hair outmost. In a country which abounds so greatly in furs, very little more use is made of the skins of seals in the article of dress than what has been mentioned. But the Koriaks, the Oloutores, and Tchutschis, form with the skins canoes and vessels of different sizes, some large enough to carry thirty people.

"Seals swarm on all the coast of Kamtschatka, and will go up the rivers eighty versts in pursuit of fish. The Tungusi give the milk of these animals to their children instead of physick. The navigators observed abundance of seals about Bering's island, but that they decreased in numbers as they advanced towards the straits; for where the walrus abounded, the seals grew more and more scarce.

"I did not observe any seal-skin garments among those brought over by the navigators, such as one might have expected among the Esquimaux of the high latitudes they visited, and which are so much in use with those of Hudson's Bay and Labrador. That species of dress doubtless was worn in the earliest times. These people wanted their historians; but we are assured that the Matigeta clothed themselves in the skins of seals. They, according to D'Anville, inhabited the country to the east of the Caspian sea, and the lake Aral, both of which waters abound with seals.

"Seals are now become a great article of commerce. The oil from the vast whales is no longer equal to the demand for supplying the magnificent profusion of

Phoca.

lamps in and round our capital. The chase of these animals is redoubled for that purpose; and the skins, properly tanned, are in considerable use in the manufacture of boots and shoes."

4. The phoca barbata, or great seal, has long white whiskers with curled points. The back is arched; hair black, very deciduous, and very thinly dispersed over a thick skin, which is almost naked in summer. The teeth of this species are like those of the common seal; the fore-feet are like the human hand, the middle toe being the longest and the thumb short. They are upwards of 12 feet long.

The inhabitants of Greenland cut out of the skin of this species thongs and lines, a finger-thick, for the seal-fishery. Its flesh is as white as veal, and is esteemed the most delicate of any. They produce plenty of lard, but very little oil. The skins of the young are sometimes used to lie on.—It inhabits the high sea about Greenland, is very timid, and commonly rests on the floating ice. It breeds about the month of March, and brings forth a single young on the ice, generally among the islands; for then it approaches a little nearer to the land. The great old ones swim very slowly.

On the northern coast of Scotland is found a seal twelve feet long. A young one, seven feet and a half long, was shown in London some years ago, which was so far from maturity as to have scarcely any teeth*: yet the common seals have them complete before they attain the size of six feet, their utmost growth.

A species larger than an ox was found in the Kamtschatkan seas from 56 to 64 north latitude, called by the natives *lachtak*†. They weighed 800 pounds, and were eaten by Bering's crew; but their flesh was very loathsome‡. The cubs are entirely black.

Steller has given accounts of other seals found in those wild seas; but his descriptions are so very imperfect as to render it impossible to ascertain the species. He speaks in his MSS. of a middle-sized kind, wholly and most elegantly spotted; of another which is black with brown spots, having the belly of a yellowish white, and as large as a yearling ox. He mentions a third species, black, and with a particular formation of the hinder legs; and a fourth of a yellowish colour, with a great circle on it of the colour of cherries||.

5. The phoca fœtida, or rough seal, is distinguished by a short nose and short round head; a body almost elliptical, covered with lard almost to the hind feet. This species seldom if ever exceeds four feet in length. Their hairs are closely set together, soft, long, and somewhat erect, intermixed with curled. They are of a dusky colour, mixed with white, which sometimes varies to white, with a dusky dorsal line.

This species never frequents the high seas, but keeps on the fixed ice in the remote bays near the frozen land; and when old never forsakes its haunts. They couple in June, and bring forth in January on the fixed ice, its proper element. In that cold situation they have a hole for the benefit of fishing; near which they generally remain solitary, being rarely found in pairs. They are very incautious, and often sleep on the surface of the water, by which means they become an easy prey to the eagle. They feed on small fish, shrimps, &c. The skin, tendons, and lard, are used in the same

way with those of other seals. The flesh is red and fœtid, especially in males, which is nauseated even by the inhabitants of Greenland.

The seal-hunters in Newfoundland have a larger kind, which they call the *square phipper*, and which weighs 500 pounds. Its coat is like that of a water-dog; so that it appears by the length of its hair to be allied to this species; but the vast difference in size admits not of certainty in this respect.

6. The phoca leporina, or leporine seal, has hair of a dirty white colour, tinged with yellow, but never spotted. The hairs are erect, interwoven, and soft like those of a hare, especially in the young. The head is long; the upper lip swelling and thick; the whiskers very strong and very thick, ranged in 15 rows, covering the whole front of the lip, so that it appears bearded; the eyes are blue, and the pupil of them black; the teeth are strong; the fore-feet are short; the membranes of the hind feet are even and not waved; the tail is short and thick, it being four inches two lines in length; the cubs are of a milk white colour. The length of the species is about six feet six inches, and the circumference where greatest five feet two.

This species inhabits the White Sea in the summer time, and ascends and descends the mouths of rivers with the tide in quest of prey. It is likewise found on the coasts of Iceland, and within the polar circle from Spitzbergen to Tchutki Nofs, and from thence southward about Kamtschatka.

There are several other species of this genus, and a variety of curious particulars respecting them, which our limits permit us not to give. Such of our readers, however, as wish for further information on this subject, will find themselves amply gratified by a careful perusal of what Mr Pennant has written on the subject, from whose labours we have extracted much of our article. See his *History of Quadrupeds*, Vol. II. p. 518—536. his *Artic Zoology*, Vol. I. p. 151—177. and his *British Zoology*, as also the several authors whose works he quotes.

PHOCÆA, the last town of Ionia, (Mela, Pliny); of Æolis, (Ptolemy), because situated on the right or north side of the river Hermus, which he makes the boundary of Æolis to the south. It stood far in the land, on a bay or arm of the sea; had two very safe harbours, the one called *Lampter* the other *Naustathmos*, (Livy). It was a colony of Ionians, situated in the territory of Æolis, (Herodotus). Massilia in Gaul was again a colony from it. *Phocæenses*, the people, (Livy); *Phocæicus*, the epithet, (Lucan); applied to *Marseilles*. It was one of the 12 cities which assembled in the panionium or general council of Ionia.

Some writers tell us, that while the foundations of this city were laying, there appeared near the shore a great shoal of sea-calves; whence it was called *Phocæa*, the word *phoca* signifying in Greek a *sea-calf*. Ptolemy, who makes the river Hermus the boundary between Æolia and Ionia, places Phocæa in Æolis; but all other geographers reckon it among the cities of Ionia. It stood on the sea-coast, between Cuma to the north, and Smyrna to the south, not far from the Hermus; and was, in former times, one of the most wealthy and powerful cities of all Asia; but is now a

Phoca
Phocæa.

* Phil.
Transf.
Abz. ix. 74
tab. v.
xlviii. 120.

† Nov. Com.
Petrof. ii.
290.

‡ Muller's
Foy.

|| Dr Pal-
las, &
Defer.
Kamtschat-
ka, 420.

Ancient
Univ. Hist.
vol. vi.

Phocæa. poor beggarly village, though the see of a bishop. The Phocæans were expert mariners, and the first among the Greeks that undertook long voyages; which they performed in galleys of fifty oars. As they applied themselves to trade and navigation, they became acquainted pretty early with the coasts and islands of Europe, where they are said to have founded several cities, namely, Velia in Italy; Alalia, or rather Aleria, in Corsica; and Marseilles in Gaul. Neither were they unacquainted with Spain; for Herodotus tells us, that, in the time of Cyrus the Great, the Phocæans arriving at Sartessus, a city in the Bay of Cadiz, were treated with extraordinary kindness by Arganthionus king of that country; who, hearing that they were under no small apprehension of the growing power of Cyrus, invited them to leave Ionia, and settle in what part of his kingdom they pleased. The Phocæans could not be prevailed upon to forsake their country; but accepted a large sum of money, which that prince generously presented them with, to defray the expence of building a strong wall round their city. The wall they built on their return; but it was unable to resist the mighty power of Cyrus, whose general Harpagus, investing the city with a numerous army, soon reduced it to the utmost extremities. The Phocæans, having no hopes of any succour, offered to capitulate; but the conditions offered by Harpagus seeming severe, they begged he would allow them three days to deliberate; and, in the mean time, withdraw his forces. Harpagus, though not ignorant of their design, complied with their request. The Phocæans, taking advantage of this concession, put their wives, children, and all their most valuable effects, on board several vessels which they had ready equipped, and conveyed them safe to the island of Chios, leaving the Persians in possession of empty houses. Their design was to purchase the Cænesian islands, which belonged to the Chians, and settle there. But the Chians not caring to have them so near, lest they should engross all the trade to themselves, as they were a sea-faring people, they put to sea again; and, having taken Phocæa, their native country, by surprise, put all the Persians they found in it to the sword. They went to Corsica; great part of them however returned very soon, as did the rest also in a few years. They then lived in subjection either to the Persians, or tyrants of their own. Among the latter we find mention made of Laodamus, who attended Darius Hystaspis in his expedition against the Scythians; and of Dionysius, who, joining Aristagoras, tyrant of Miletus, and chief author of the Ionian rebellion, retired, after the defeat of his countrymen, to Phœnicia, where he made an immense booty, seizing on all the ships he met with trading to that country. From Phœnicia he sailed to Sicily, where he committed great depredations on the Carthaginians and Tuscans; but is said never to have molested the Greeks.

In the Roman times the city of Phocæa sided with Antiochus the Great; whereupon it was besieged, taken, and plundered, by the Roman general; but allowed to be governed by its own laws. In the war which Aristonicus brother to Attalus, king of Pergamus, raised against the Romans, they assisted the former to the utmost of their power; a circumstance which so displeased the senate, that they commanded the town to be demolished, and the whole race of the Phocæans

to be utterly rooted out. This severe sentence would have been put in execution, had not the Massilienses, a Phocæan colony, interposed, and, with much difficulty, assuaged the anger of the senate. Pompey declared Phocæa a free city, and restored the inhabitants to all the privileges they had ever enjoyed; whence, under the first emperors, it was reckoned one of the most flourishing cities of all Asia Minor. This is all we have been able to collect from the ancients touching the particular history of Phocæa.

PHOCAS, a Roman centurion, was raised to the dignity of emperor by the army, and was crowned at Constantinople about the year 603. The emperor Mauritius, who was thus deserted both by the army and the people, fled to Chalcedon with his five children, whom Phocas caused to be inhumanly murdered before his eyes, and then he murdered Mauritius himself, his brother, and several other persons who were attached to that family.

Phocas, thus proclaimed and acknowledged at Constantinople, sent, according to custom, his own image and that of his wife Leontia to Rome, where they were received with loud acclamations, the people there being incensed against Mauritius on account of the cruel exactions of the exarchs, and his other ministers in Italy. Gregory, surnamed the Great, then bishop of Rome, caused the images to be lodged in the oratory of the martyr Cæsarius, and wrote letters to the new emperor, congratulating him upon his advancement to the throne, which he said was effected by a particular providence, to deliver the people from the innumerable calamities and heavy oppressions under which they had long groaned. Had we no other character of Phocas and Leontia but that which has been conveyed to us in Gregory's letters, we should rank him amongst the best princes mentioned in history; but all other writers paint him in quite different colours; and his actions, transmitted to us by several historians, evidently speak him a most cruel and blood-thirsty tyrant. He was of middling stature, says Cedrenus, deformed, and of a terrible aspect: his hair was red, his eye-brows met, and one of his cheeks was marked with a scar, which, when he was in a passion, grew black and frightful: he was greatly addicted to wine and women, blood-thirsty, inexorable, bold in speech, a stranger to compassion, in his principles a heretic. He endeavoured, in the beginning of his reign, to gain the affections of the people by celebrating the Circensian games with extraordinary pomp, and distributing on that occasion large sums amongst the people; but finding that instead of applauding they reviled him as a drunkard, he ordered his guards to fall upon them. Some were killed, many wounded, and great numbers were dragged to prison: but the populace rising, set them at liberty, and thenceforth conceived an irreconcilable aversion to the tyrant.

As soon as the death of Mauritius was known, Nartius, who then commanded the troops quartered on the frontiers of Persia, revolted. Phocas, however, managed matters so as to gain him over to his interest, and then treacherously and cruelly burnt him alive. He endeavoured to strengthen his cause by respectable alliances; but his cruelty was such as to render him generally hated, for he spared neither sex nor age, and amongst others he murdered Constantina the widow of Mauritius,

Phocas.

*Ancient
Univ. Hist.
v. 15.*

Phocas
II
Phocion.

Mauritius, and her daughters. These cruelties were at length the cause of his downfall. He became universally hateful; and persons in great authority near his person conspired against him. This conspiracy, however, was discovered, and the persons concerned in it were all put to death. The following year, however, 610, he was overtaken by the fate he had so long deserved.

Heraclius, the son of the governor of Africa, who bore the same name, taking upon him the title of emperor, and being acknowledged as such by the people of Africa, sailed from thence with a formidable fleet, and a powerful army on board, for Constantinople, while Nicetas marched thither by way of Alexandria and the Pentapolis. Heraclius forced his course to Alydus, where he was received with great demonstrations of joy by several persons of rank, who had been banished by Phocas. From Aylus he sailed to Constantinople, where he engaged and utterly defeated the tyrant's fleet. Phocas took refuge in the palace; but one Photinus, whose wife he had formerly debauched, pursuing him with a party of soldiers, forced the gates, dragged the cowardly emperor from the throne, and having stripped him of the imperial robes, and clothed him with a black veil, carried him in chains to Heraclius, who commanded first his hands and feet, then his arms, and at last his head, to be cut off: the remaining part of his body was delivered up to the soldier, who burnt it in the forum. We are told, that Heraclius having reproached him with his evil administration, he answered, with great calmness, "It is incumbent upon you to govern better." Such was the end of this cruel tyrant, after he had reigned seven years and some months.

PHOCILIDES, a Greek poet and philosopher of Miletus, flourished about 540 years before the Christian era. The poetical piece now extant, attributed to him, is not of his composition, but of another poet who lived in the reign of Adrian.

PHOCION was a distinguished Athenian general and orator in the time of Philip II. of Macedon. His character is thus described in the *Ancient Universal History*. "He was too modest to solicit command, nor did he promote wars that he might raise his authority by them; though, taken either as a soldier, orator, statesman, or general, he was by far the most eminent Athenian of his time. As he was a most disinterested patriot, he could entertain no great affection for Philip: but as he perfectly well knew the disposition of his countrymen, and how unlikely they were long to support such measures as were necessary to humble the Macedonian power, he did not express himself vehemently, but chose rather to cultivate the esteem which on all occasions Philip showed for the state of Athens, as a mean of preserving her, when she should be reduced to that situation which he conceived they wanted virtue to prevent. From this character the reader will easily discern that Demosthenes and he could not well agree. The former was always warm, his language copious, and his designs extensive: and Phocion, on the other hand, was of a mild temper, delivered his opinion in very few words, and proposed schemes at once necessary and easy to be effected. Yet he seldom or never concurred with the people, but

spoke as poignantly against their vices as Demosthenes himself; inasmuch that this orator once told him, 'The Athenians, Phocion, in some of their mad fits, will murder thee.' 'The same (answered he) may fall to thee, Demosthenes, if ever they come to be sober.'

He was afterwards appointed to command the army which was sent to assist the Byzantines against Philip, whom he obliged to return to his own dominions. This truly great man, whom (though extremely poor) no sum could bribe to betray his country, and who at every risk on all occasions gave them sound advice, was at length accused by his ungrateful countrymen. This event happened in the year before Christ 318. He was sent to Athens by Polyperchon head of a faction in Macedonia, together with his friends, chained in carts, with this message, "That though he was convinced they were traitors, yet he left them to be judged by the Athenians as a free people." Phocion demanded whether they intended to proceed against him by form of law; and some crying out that they would, Phocion demanded how that could be if they were not allowed a fair hearing? but perceiving, by the clamour of the people, that no such thing was to be expected, he exclaimed, "As for myself, I confess the crime objected to me, and submit to the judgment of the law; but consider, O ye Athenians, what have these poor innocent men done that they should be involved in the same calamity with me?" The people replied with great vociferation, "They are your accomplices, and that is enough." Then the decree was read, adjudging them all to death, viz. Phocion, Nicoteles, Aheudippus, Agamon, and Pythocles; these were present: Demetrius, Phalereus, Callimedon, Charicles, and others, were condemned in their absence. Some moved that Phocion might be tortured before he was put to death; nay, they were for bringing the rack into the assembly, and torturing him there. The majority, however, thought it enough if he was put to death, for which the decree was carried unanimously; some putting on garlands of flowers when they gave their votes. As he was going to execution, a person who was his intimate friend asked him if he had any message for his son? "Ye," replied Phocion; "tell him it is my last command that he forget how ill the Athenians treated his father."

The spleen of his enemies was not extinguished with his life: they passed a decree whereby his corpse was banished the Athenian territories; they likewise forbade any Athenians to furnish fire for his funeral pile. One Conopian took up the corpse, and carried it beyond Eleusina, where he borrowed some fire of a Megarian woman and burned it. A Megarian matron, who attended with her maid, raised on the place an honorary monument; and having gathered up the bones, carried them home, and buried them under her own hearth; praying at the same time thus to the Penates: "To you, O ye gods, guardians of this place, I commit the precious remains of the most excellent Phocion. Protect them, I beseech you, from all insults; and deliver them one day to be reposit in the sepulchre of his ancestors, when the Athenians shall become wiser." It was not long before this opportunity occurred. When the Athenians began to cool a little, and remember the

*Ancient
Univ. Hist.*
v. 5.

Phoc's the many services they had received from Phocion, they decreed him a statue of brass; ordered his bones to be brought back at the public expence; and decreed that his accusers should be put to death. Agnonides, who was principally concerned in that tragedy, suffered; but Epicurus and Demophilus, who were also accomplices in it, fled. However, Phocion's son met with them, and executed his revenge upon them; which was almost the only good action he ever performed, as he had a very small share of his father's abilities, and not any of his virtues. Such is the fickleness and such the injustice of popular governments; failings which, if we are to judge from universal experience, are absolutely inseparable from them.

PHOCIS, (Demosthenes, Strabo, Pausanias); a country of Greece, contained between Bœotia to the east and Locris to the west, but extending formerly from the Sinus Corinthiacus on the south to the sea of Eubœa on the north, and, according to Donysius, as far as Thermopylæ; but reduced afterwards to narrower bounds. *Phocnes*, the people; *Phocicus*, the epithet, (Justin.) *Bellum Phocicum*, the sacred war which the Thebans and Philip of Macedon carried on against them for plundering the temple at Delphi; and by which Philip paved the way to the sovereignty of all Greece, (Justin.) Its greatest length was from north to south, that is, from 38° 45' to 39° 20', or about 35 miles; but very narrow from east to west, not extending to 30 miles, that is, from 23° 10' to 23° 40' at the widest, but about 23 miles towards the Corinthian bay, and much narrower still towards the north. This country is generally allowed to have taken its name from Phocus the son of Ornytion, a native of Corinth; but having been soon after invaded by the Eginetæ, under the conduct of another Phocus, who was the son of Eacus king of Enopia, the memory of the first insensibly gave way to that of the second.

In Phocis there were many celebrated mountains, such as Cythæron, Helicon, and Parnassus. The last two we have already noticed in the order of the alphabet. Cythæron was consecrated to the muses as well as the other two, and was consequently much celebrated by the poets. Both it and Helicon contend with mount Parnassus for height and magnitude. There were no remarkable rivers in Phocis except Cephissus, which runs from the foot of Parnassus northward, and empties itself in the Pindus, which was near the boundary of that kingdom. It had several very considerable cities; such as Cyrra, Crissa, and Antecyrra, which, according to Ptolemy, were on the sea coasts; and Pythia, Delphi, Daulis, Elatia, Ergasthenia, and Baulia, which were inland towns. Elatia was the largest and richest after Delphi.

Deucalion was king of that part of Phocis which lies about Parnassus, at the time that the Cecrops flourished in Attica; but the Phocians afterwards formed themselves into a commonwealth, to be governed by their general assembly, the members of which were chosen from among themselves, and were changed as often as occasion required. Of the history of the Phocians but little is known till the time of the holy war, of which we have the following account in the Ancient Universal History.

"The Phocians having presumed to plough the territories of the city of Cyrra, consecrated to the Delphic god, were summoned by the other Grecian states before the court of the Amphictyons, where a considerable fine was imposed upon them for their sacrilege. They refused to pay it, on pretence that it was too large; and at the next assembly their dominions were adjudged confiscated to the use of the temple. This second sentence exasperated the Phocians still more; who, at the instigation of one Philomelus, or, as he is called by Plutarch, Philomedes, seized upon the temple, plundered it of its treasures, and held the sacred depositum for a considerable time. This second crime occasioned another assembly of the Amphictyons, the result of which was a formal declaration of war against the Phocians. The quarrel being become more general, the several states took part in it according to their inclinations or interest. Athens, Sparta, and some others of the Peloponnesians, declared for the Phocians; and the Thebans, Thessians, Locrians, and other neighbouring states, against them. A war was commenced with great fury on both sides, and styled the *holy war*, which lasted ten years; during which the Phocians, having hired a number of foreign troops, made an obstinate defence, and would in all probability have held out much longer had not Philip of Macedon given the finishing stroke to their total defeat and punishment. The war being ended, the grand council assembled again, and imposed an annual fine of 60 talents upon the Phocians, to be paid to the temple, and continued till they had fully repaired the damage it had sustained from them; and, till this reparation should be made, they were excluded from dwelling in walled towns, and from having any vote in the grand assembly. They did not, however, continue long under this heavy sentence: their known bravery made their assistance so necessary to the rest, that they were glad to remit it; after which remission they continued to behave with their usual courage and resolution, and soon obliterated their former guilt."

We cannot finish this article without mentioning more particularly Daulis, rendered famous, not so much for its extent or richness, as for the stature and prowess of its inhabitants; but still more for the inhuman repast which was served up to Tereus king of Thrace by the women of this city, by whom he was soon after murdered for the double injury he had done to his sister-in-law Philomela, daughter of Pandion king of Athens. See PHILOMELA.

PHŒBUS, one of the names given by ancient mythologists to the Sun, Sol, or Apollo. See APOLLO.

PHŒNICIA, or more properly PHŒNICE, the ancient name of a country lying between the 34th and 36th degrees of north latitude; bounded by Syria on the north and east, by Judæa on the south, and by the Mediterranean on the west. Whence it borrowed its name is not absolutely certain. Some derive it from one Phœnix; others from the Greek word *phœnix*, signifying a *palm* or *date*, as that tree remarkably abounded in this country. Some again suppose that Phœnice is originally a translation of the Hebrew word *Edom*, from the Edomites who fled thither in the days of David. By the contraction of Canaan it was also called

Phœnicia. called *Chna*, and anciently *Rabbotin* and *Colpitis* (A). The Jews commonly named it *Canaan*; though some part of it, at least, they knew by the name of *Syrophœnicia* (B). Bochart tells us that the most probable etymology is *Phœn Anak*, i. e. "the descendants of Anak." Such were the names peculiar to this small country; though Phœnicia was sometimes extended to all the maritime countries of Syria and Judæa, and Canaan to the Philistines, and even to the Amalekites. On the contrary, these two names, and the rest, were most generally swallowed up by those of Palestine and Syria (C).

There is some disagreement among authors with respect to the northern limits of this country. Ptolemy makes the river Eleutherus the boundary of Phœnicia to the north; but Pliny, Meli, and Stephanus, place it in the island of Aradus, lying north of that river. Strabo observes, that some will have the river Eleutherus to be the boundary of Seleucia, on the side of Phœnicia and Cœlesyria. On the coast of Phœnicia, and south of the river Eleutherus, stood the following cities: SIMYRA, Orthosia, TRIPOLIS, Botrys, Byblus, Palæbyblus, Berytus, SIDON, SAREPTA, TYRUS, Palætyrus.

Phœnicia extended, according to Ptolemy, even beyond mount Carmelus; for that geographer places in Phœnicia not only Ecdippa and Ptolemais, but Sycaminum and Dæra, which stand south of that mountain. These, however, properly speaking, belonged to Palestine. We will not take upon us to mark out the bounds of the midland Phœnicia. Ptolemy reckons in it the following towns: Arca, Palæbyblus (Old Byblus), Gabala, and Cæsaria Panice. This province was considerably extended in the times of Christianity; when, being considered as a province of Syria, it included not only Damascus but Palmyra also.

The soil of this country is good, and productive of many necessaries for food and clothing. The air is wholesome, and the climate agreeable. It is plentifully watered by small rivers; which, running down from mount Libanus, sometimes swell to an immoderate degree, either increased by the melting of the snows on that mountain, or by heavy rains. Upon these occasions they overflow, to the great danger and hindrance of the traveller and damage of the country. Among these rivers is that of *ANONIS*.

It is universally allowed that the Phœnicians were Canaanites (D) by descent: nothing is plainer or less

contested, and therefore it were time lost to prove it. Phœnicia. We shall only add, that their blood must have been mixed with that of foreigners in process of time, as it happens in all trading places; and that many strange families must have settled among them, who could consequently lay no claim to this remote origin, how much soever they may have been called Phœnicians, and reckoned of the same descent with the ancient proprietors.

The Phœnicians were governed by kings; and their territory, as small a slip as it was, included several kingdoms; namely, those of Sidon, Tyre, Aradus, Berytus, and Byblus. In this particular they imitated and adhered to the primitive government of their forefathers; who, like the other Canaanites, were under many petty princes, to whom they allowed the sovereign dignity, reserving to themselves the natural rights and liberties of mankind. Of their civil laws we have no particular system.

With regard to religion, the Phœnicians were the most gross and abominable idolaters. The Baal-berith, Baalzebub, Baalsamen, &c. mentioned in Scripture, were some of the Phœnician gods; as were also the Moloch, Ashtaroth, and Thammuz, mentioned in the sacred writings.—The word *Baal*, in itself an appellative, was no doubt applied to the tree God, until he rejected it on account of its being so much profaned by the idolaters. The name was not appropriated to any particular deity among the idolatrous nations, but was common to many; however, it was generally imagined that one great God presided over all the rest. Among the Phœnicians this deity was named *Baal-samen*; whom the Hebrews would have called *Baal-shemim*, or the God of heaven. In all probability this was also the principal Carthaginian deity, though his Punic name is unknown. We have many religious rites of the Carthaginians handed down to us by the Greek and Roman writers; but they all bestowed names of their own gods upon those of the Carthaginians, which leads us to a knowledge of the correspondence between the characters of the Phœnician and European deities. The principal deity of Carthage, according to Diodorus Siculus, was Chronus or Saturn. The sacrifices offered up to him were children of the best families. Our author also tells us, that the Carthaginians had a brazen statue or colossus of this god, the hands of which were extended in act to receive, and bent downwards in such a manner, that the child laid thereon

(A) This last name is a translation of the first. *Rabbotsen* is in Hebrew a great gulph or bay. From *rabbotsen*, by changing the Hebrew *s* into the Greek *t*, comes *rabboten*; and, with a little variation, *rbabbotin*. *Kolpos*, is Greek also for a bay or gulph; whence it appears that *colpitis* or *colpites* is a translation of *rabbotin*.

(B) Bochart supposes that the borderers, both upon the Phœnician and Syrian side, were called by the common name of Syrophœnicians, as partaking equally of both nations.

(C) Or rather Phœnicia, Palestine, and Syria, were promiscuously used for each other, and particularly the two former. Phœnicia and Palestine, says Stephanus Byzantinus, were the same. As for Syria, we have already observed, that in its largest extent it sometimes comprehended Phœnicia and Cœlesyria. Herodotus plainly confounds these three names; we mean, uses one for the other indifferently.

(D) Bochart insinuates that the Canaanites were ashamed of their name, on account of the curse denounced on their progenitor, and terrified by the wars so vigorously and successfully waged on them by the Israelites, purely because they were Canaanites; and that therefore, to avoid the ignominy of the one and the danger of the other, they abjured their old name, and changed it for Phœnicians, Syrians, Syrophœnicians, and Assyrians. Heidegger conjectures also that they were ashamed of their ancestor Canaan.

Phœnicia. thereon immediately fell down into a hollow where there was a fiery furnace. He adds also, that this inhuman practice seemed to confirm a tradition, handed down to the Greeks from very early antiquity, viz. that Saturn devoured his own children.

The goddess Cœlestis, or Urania, was held in the highest veneration by the Carthaginians. She is thought to have been the same with the queen of heaven mentioned in Jeremiah, the Juno Olympia of the Greeks. According to Hesychius, the same word applied in the Punic language both to Juno and Venus: Nay, the ancient Greeks frequently confound Juno, Venus, and Diana or the moon, all together; which is to be attributed to the Egyptians and Phœnicians, from whom they received their system of religion; who seem in the most ancient times to have had but one name for them all. Besides these there were several other deities of later date, who were worshipped among the Phœnicians, particularly those of Tyre, and consequently among the Carthaginians also. These were Jupiter, Apollo, Mars, and Bacchus. Jupiter was worshipped under the name of *Belus* or *Baal*. To him they addressed their oaths; and placed him for the most part, as there is reason to believe, at the head of their treaties. The same name was also given to the other two, whence they were frequently mistaken for one another. Apollo or the sun went either by this name simply, or by others of which this made a part.

The Carthaginian superstition, however, was not confined to these deities alone. They worshipped also the fire, air, and other elements; and had gods of rivers, meads, &c. Nay, they paid divine honours to the spirits of their heroes, and even to men and women themselves while yet in life; and in this adoration Hannibal the Great had for some time a share, notwithstanding the infamous conduct of his countrymen towards him at last. In order to worship those gods with more conveniency on all occasions, the Carthaginians had a kind of portable temples. These were only covered chariots, in which were some small images representing their favourite deities; and which were drawn by oxen. They were also a kind of oracle; and their responses were understood by the motion impressed upon the vehicle. This was likewise an Egyptian or Libyan custom; and Tacitus informs us that the ancient Germans had something of the same kind. The tabernacle of Moloch is thought to have been a machine of this kind; and it is not improbable that the whole was derived from the tabernacle of the Jews in the wilderness.

Besides all the deities above-mentioned, we still find another, named the *Dæmon* or *Genius* of Carthage, mentioned in the treaty made by Philip of Macedon and Hannibal. What this deity might be, we know not; however, it may be observed, that the pagan world in general believed in the existence of demons, or intelligences who had a kind of middle nature between gods and men, and to whom the administration of the world was in a great measure committed. Hence it is no wonder that they should have received religious honours. For when once mankind were possessed with the opinion that they were the ministers of the gods, and trusted with the dispensation of their favours, as well as the infliction of their punishments, it is natural

to suppose that they would be desirous of making their addresses to them. See **ASTARTE** and **POLYTHEISM**.

Herodotus supposes the Phœnicians to have been circumcised; but Josephus asserts, that none of the nations included under the vague name of Palestine and Syria used that rite, the Jews excepted; so that if the Phœnicians had anciently that custom, they came in time to neglect it, and at length wholly laid it aside. They abstained however from the flesh of swine.

Much is said of their arts, sciences, and manufactures; but as what we find concerning them is couched in general terms only, we cannot descant on particulars. The Sidonians, under which denomination we comprehend the Phœnicians in general, were of a most happy genius. They were from the beginning, addicted to philosophical exercises of the mind; inasmuch that a Sidonian, by name Moschus, taught the doctrine of atoms before the Trojan war: and Abomenus of Tyre puzzled Solomon by the subtilty of his questions. Phœnice continued to be one of the seats of learning, and both Tyre and Sidon produced their philosophers of later ages; namely, Boethus and Diodatus of Sidon, Antipater of Tyre, and Appollonius of the same place; who gave an account of the writings and disciples of Zeno. For their language, see **PHILOLOGY**, n° 61. As to their manufactures, the glass of Sidon, the purple of Tyre, and the exceeding fine linen they wove, were the product of their own country, and their own invention; and for their extraordinary skill in working metals, in hewing timber and stone; in a word, for their perfect knowledge of what was solid, great, and ornamental in architecture—we need only put the reader in mind of the large share they had in erecting and decorating the temple at Jerusalem under their king Hiram. Their fame for taste, design, and ingenious invention, was such, that whatever was elegant, great, or pleasing, whether in apparel, vessels, or toys, was distinguished by way of excellence with the epithet of Sidonian.

The Phœnicians were likewise celebrated as merchants, navigators, and planters of colonies in foreign parts. As merchants, they may be said to have engrossed all the commerce of the western world: as navigators, they were the boldest, the most experienced, and greatest discoverers, of the ancient times: they had for many ages no rivals. In planting colonies they exerted themselves so much, that, considering their habitation was little more than the slip of ground between mount Libanus and the sea, it is surprising how they could furnish such supplies of people, and not wholly depopulate their native country.

It is generally supposed that the Phœnicians were induced to deal in foreign commodities by their neighbourhood with the Syrians, who were perhaps the most ancient of those who carried on a considerable and regular trade with the more eastern regions: and this conjecture appears probable at least; for their own territory was but small, and little able to afford any considerable exports, if we except manufactures: but that their manufactures were anyways considerable till they began to turn all the channels of trade into their own country, it is hard to believe. In Syria, which was a large country, they found store of productions of the natural growth of that soil, and many choice and useful commodities brought from the east. Thus, having

Phœnicia. a safe coast, with convenient harbours, on one side, and excellent materials for ship-building on the other; perceiving how acceptable many commodities that Syria furnished would be in foreign parts, and being at the same time, perhaps, shown the way by the Syrians themselves, who may have navigated the Mediterranean—they turned all their thoughts to trade and navigation, and by an uncommon application soon eclipsed their masters in that art.

It were in vain to talk of the Edomites, who fled hither in David's time; or to inquire why Herodotus supposes the Phœnicians came from the Red Sea: their origin we have already seen. That some of the Edomites fled into this country in the days of David, and that they were a trading people, is very evident: what improvements they brought with them into Phœnicia, it is hard to say; and by the way, it is as difficult to ascertain their numbers. In all probability they brought with them a knowledge of the Red Sea, and of the south parts of Arabia, Egypt, and Ethiopia; and by their information made the Phœnicians acquainted with those coasts; by which means they were enabled to undertake voyages to those parts, for Solomon, and Pharaoh Necho, king of Egypt.

Their whole thoughts were employed on schemes to advance their commerce. They affected no empire but that of the sea; and seemed to aim at nothing but the peaceable enjoyment of their trade. This they extended to all the known parts they could reach; to the British isles, commonly understood by the Cassiterides; to Spain, and other places in the ocean, both within and without the Straits of Gibraltar; and, in general, to all the ports of the Mediterranean, the Black Sea, and the Lake Mæotis. In all these parts they had settlements and correspondents, from which they drew what was useful to themselves, or might be so to others; and thus they exercised the three great branches of trade, as it is commonly divided into importation, exportation, and transportation, in full latitude. Such was their sea-trade; and for that which they carried on by land in Syria, Mesopotamia, Assyria, Babylonia, Persia, Arabia, and even in India, it was of no less extent, and may give us an idea of what this people once was, how rich and how deservedly their merchants are mentioned in Scripture as equal to princes. Their country was, at that time, the great warehouse, where every thing that might either administer to the necessities or luxury of mankind was to be found; which they distributed as they judged would be best for their own interest. The purple of Tyre, the glass of Sidon, and the exceeding fine linen made in this country, together with other curious pieces of art in metals and wood, already mentioned, appear to have been the chief and almost only commodities of Phœnicia itself. Indeed their territory was so small, that it is not to be imagined they could afford to export any of their own growth; it is more likely that they rather wanted than abounded with the fruits of the earth.

Having thus spoken in general terms of their trade, we shall now touch upon their shipping and some things remarkable in their navigation. Their larger embarkations were of two sorts; they divided them into round ships or gauli; and long ships, galleys, or trimmes. When they drew up in line of battle, the gauli were disposed at a small distance from each other in the

wings, or in the van and the rear: their trimmes were contracted together in the centre. If, at any time, they observed that a stranger kept them company in their voyage, or followed in their track, they were sure to get rid of him if they could, or deceive him if possible; in which policy they went so far, as to venture the loss of their ships, and even their lives; so jealous were they of foreigners, and so tenaciously bent on keeping the whole trade to themselves. In order to discourage other nations from engaging in commerce, they practised piracy, or pretended to be at war with such as they met when they thought themselves strongest. This was but a natural stroke of policy in people who grasped at the whole commerce of the then known world. We must not forget here the famous fishery of Tyre, which so remarkably enriched that city in particular. See ASTRONOMY, n° 7. OPHIR, and TYRE.

PHOENICOPITERUS, or FLAMINGO, in ornithology, a genus of birds belonging to the order of gallæ. The beak is naked, teathed, and bent as if it was broken; the nostrils are linear; the feet are palmed, and four-toed. There is but one species; viz. the Bahamentis of Catesby, a native of Africa and America.

This bird resembles the heron in shape, excepting the bill, which is of a very singular form. It is two years old before it arrives at its perfect colour; and then it is entirely red, excepting the quill-feathers, which are black. A full-grown one is of equal weight with a wild duck; and when it stands erect, it is five feet high. The feet are webbed. The flesh is delicate; and most resembles that of a partridge in taste. The tongue, above any other part, was in the highest esteem with the luxurious Romans. These birds make their nests on hillocks in shallow water; on which they sit with their legs extended down, like a man sitting on a stool. They breed on the coasts of Cuba and the Bahama islands in the West Indies; and frequent salt-water only. By reason of the particular shape of its bill, this bird, in eating, twists its neck from side to side, and makes the upper mandible touch the ground. They are very stupid, and will not rise at the report of a gun; nor is it any warning to those who survive, that they see others killed by their side; so that, by keeping himself out of sight, a fowler may kill as many as he pleases.

These birds prefer a warm climate. In the old *Latom's* continent they are not often met with beyond 40 de. *Synops.* grees north or south. They are met with everywhere on the African coast and adjacent isles, to the Cape of Good Hope; and sometimes on the coasts of Spain, Italy, and those of France lying in the Mediterranean Sea; being at times found at Marseilles, and for some way up the Rhone. In some seasons they frequent Aleppo and the parts adjacent. They are seen also on the Persian side of the Caspian Sea, and from thence along the western coast as far as the Wolga; tho' this is at uncertain times, and chiefly in considerable flocks coming from the north-east, mostly in October and November; but so soon as the wind changes they totally disappear. They breed in the Cape Verd isles, particularly in that of Sal. They go for the most part together in flocks, except in breeding time. Dampier says, that, with two more in company, he killed 14 at once, which was effected by secreting themselves;

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for they are so very shy, that they will by no means suffer any one to approach openly near enough to shoot them. Kolben tells us, that they are very numerous at the Cape; keeping in the day on the borders of the lakes and rivers, and lodging themselves at night in the long grass on the hills. They are also common to various places in the warmer parts of America, frequenting the same latitudes as in other quarters of the world; being found at Peru, Chili, Cayenne, and the coast of Brasil, as well as the various islands of the West Indies. Sloane found them in Jamaica; but particularly at the Bahama Islands and at Cuba, where they breed. When seen at a distance, they appear as a regiment of soldiers, being ranged along-side one another, on the borders of the rivers, searching for food; which chiefly consists of small fish or the eggs of them; and of water-insects, which they search after by plunging in the bill and part of the head, from time to time trampling with their feet to muddy the water, that their prey may be raised from the bottom. Whilst they are feeding, one of them is said to stand centinel, and the moment he sounds the alarm the whole flock takes wing. This bird, when at rest, stands on one leg, the other being drawn up close to the body, with the head placed under the wing on that side of the body it stands on.

They are sometimes caught young, and are brought up tame; but are always impatient of cold: and in this state will seldom live a great while, gradually losing their colour, flesh, and appetite, and dying for want of that food which in a state of nature at large they were abundantly supplied with.

PHOENIX, in astronomy. See there, n° 4c6.

PHOENIX, the *Great Palm*, or *Date-tree*; a genus of plants belonging to the order of palmæ. There is only one species, viz. the *daçylifera*, or common date-tree, a native of Africa and the eastern countries, where it grows to 50, 60, and 100 feet high. The trunk is round, upright, and studded with protuberances, which are the vestiges of the decayed leaves. From the top issues forth a cluster of leaves or branches eight or nine feet long, extending all round like an umbrella, and bending a little towards the earth. The bottom part produces a number of stalks like those of the middle, but seldom shooting so high as four or five feet. These stalks, says Adanson, diffuse the tree very considerably; so that, wherever it naturally grows in forests, it is extremely difficult to open a passage through its prickly leaves. The date-tree was introduced into Jamaica soon after the conquest of the island by the Spaniards. There are, however, but few of them in Jamaica at this time. The fruit is somewhat in the shape of an acorn. It is composed of a thin, light, and glossy membrane, somewhat pellucid and yellowish; which contains a fine, soft, and pulpy fruit, which is firm, sweet, and somewhat vinous to the taste, esculent, and wholesome; and within this is inclosed a solid, tough, and hard kernel, of a pale grey colour on the outside, and finely marbled within like the nutmeg. For medicinal use dates are to be chosen large, full, fresh, yellow on the surface, soft and tender, not too much wrinkled; such as have a vinous taste, and do not rattle when shaken. They are produced in many parts of Europe, but never ripen perfectly there. The best are brought from Tunis; they are also very fine and good in Egypt and in many parts of the east.

Those of Spain and France look well; but are never perfectly ripe, and very subject to decay. They are preserved three different ways; some pressed and dry; others pressed more moderately, and again moistened with their own juice; and others not pressed at all, but moistened with the juice of other dates, as they are packed up, which is done in baskets or skins. Those preserved in this last way are much the best. Dates have always been esteemed moderately strengthening and astringent.

Though the date-tree grows everywhere indiscriminately on the northern coasts of Africa, it is not cultivated with care, except beyond Mount Atlas; because the heat is not sufficiently powerful along the coasts to bring the fruits to proper maturity. We shall here extract some observations from Mr Des Fontaines respecting the manner of cultivating it in Barbary, and on the different uses to which it is applied. All that part of the Zaara which is near Mount Atlas, and the only part of this vast desert which is inhabited, produces very little corn; the soil being sandy, and burnt up by the sun, is almost entirely unfit for the cultivation of grain, its only productions of that kind being a little barley, maize, and sorgho. The date-tree, however, supplies the deficiency of corn to the inhabitants of these countries, and furnishes them with almost the whole of their subsistence. They have flocks of sheep; but as they are not numerous, they preserve them for the sake of their wool; besides, the flesh of these animals is very unwholesome food in countries that are excessively warm; and these people, though ignorant, have probably been enabled by experience to know that it was salutary for them to abstain from it. The date trees are planted without any order, at the distance of 12 feet one from the other, in the neighbourhood of rivulets and streams which issue from the sand. Forests of them may be seen here and there, some of which are several leagues in circumference. The extent of these plantations depends upon the quantity of water which can be procured to water them; for they require much moisture. All these forests are intermixed with orange, almond, and pomegranate trees, and with vines which twist round the trunks of the date trees; and the heat is strong enough to ripen the fruit, though they are never exposed to the sun.

Along the rivulets and streams, dykes are erected to stop the course of their waters, in order that they may be distributed amongst the date trees by means of small canals. The number of canals is fixed for each individual; and in several cantons, to have a right to them, the proprietors are obliged to pay an annual sum proportionable to the number and extent of their plantations. Care is taken to till the earth well, and to raise a circular border around the root of each tree, that the water may remain longer and in larger quantity. The date trees are watered in every season, but more particularly during the great heats of summer.

It is generally in winter that new plantations of this tree are formed. For this purpose those who cultivate them take shoots of those which produce the best dates, and plant them at a small distance one from the other. At the end of three or four years these shoot, if they have been properly taken care of, begin to bear fruit; but this fruit is as yet dry, without sweetness,

Phoenix.

and even without kernels: they never reach the highest degree of perfection of which they are susceptible till they are about 15 or 20 years old.

These plants are however produced from the seeds taken out of the fruit, provided they are fresh. They should be sown in pots filled with light rich earth, and plunged into a moderate hot-bed of tanners bark, which should be kept in a moderate temperature of heat, and the earth frequently refreshed with water. When the plants are come up to a proper size, they should be each planted in a separate small pot, filled with the same light earth, and plunged into a hot-bed again, observing to refresh them with water, as also to let them have air in proportion to the warmth of the season and the bed in which they are placed. During the summer time they should remain in the same hot bed; but in the beginning of August, they should have a great share of air to harden them against the approach of winter; for if they are too much forced, they will be so tender as not to be preserved through the winter without much difficulty, especially if you have not the conveniency of a bark-stove to keep them in. The soil in which these plants should be placed, must be composed in the following manner, viz. half of light fresh earth taken from a pasture-ground, the other half sea-sand and rotten dung or tanners bark in equal proportion; these should be carefully mixed, and laid in a heap three or four months at least before it is used, but should be often turned over to prevent the growth of weeds, and to sweeten the earth.

The trees, however, which spring from seed never produce so good dates as those that are raised from shoots; they being always poor and ill tasted. It is undoubtedly by force of cultivation, and after several generations, that they acquire a good quality.

The date trees which have been originally sown, grow rapidly, and we have been assured that they bear fruit in the fourth or fifth year. Care is taken to cut the inferior branches of the date tree in proportion as they rise; and a piece of the root is always left of some inches in length, which affords the easy means of climbing to the summit. These trees live a long time, according to the account of the Arabs; and in order to prove it, they say that when they have attained to their full growth, no change is observed in them for the space of three generations.

The number of females which are cultivated is much superior to that of the males, because they are much more profitable. The sexual organs of the date tree grow, as is well known, upon different stalks, and these trees flower in the months of April and May, at which time the Arabs cut the male branches to im-

pregnate the female. For this purpose, they make an incision in the trunk of each branch which they wish to produce fruit, and place in it a stalk of male flowers; without this precaution the date tree would produce only abortive fruit (A). In some cantons the male branches are only shaken over the female. The practice of impregnating the date tree in this manner is very ancient. Pliny describes it very accurately in that part of his work where he treats of the palm tree.

There is scarcely any part of the date tree which is not useful. The wood, though of a spongy texture, lasts such a number of years, that the inhabitants of the country say it is incorruptible. They employ it for making beams and instruments of husbandry; it burns slowly, but the coals which result from its combustion are very strong, and produce a great heat.

The Arabs strip the bark and fibrous parts from the young date trees, and eat the substance, which is in the centre; it is very nourishing, and has a sweet taste: it is known by the name of the marrow of the date tree. They eat also the leaves, when they are young and tender, with lemon juice; the old ones are laid out to dry, and are employed for making mats and other works of the same kind, which are much used, and with which they carry on a considerable trade in the interior parts of the country. From the sides of the stumps of the branches which have been left arise a great number of delicate filaments, of which they make ropes, and which might serve to fabricate cloth.

Of the fresh dates and sugar, says Hasselquist, the Egyptians make a conserve, which has a very pleasant taste. In Egypt they use the leaves as fly-flaps, for driving away the numerous insects which prove so troublesome in hot countries. The hard boughs are used for fences and other purposes of husbandry; the principal stem for building. The fruit, before it is ripe, is somewhat astringent; but when thoroughly mature, is of the nature of the fig. The Senegal dates are shorter than those of Egypt, but much thicker in the pulp, which is said to have a sugary agreeable taste, superior to that of the best dates of the Levant.

A white liquor, known by the name of *milk*, is drawn also from the date tree. To obtain it, all the branches are cut from the summit of one of these trees, and after several incisions have been made in it, they are covered with leaves, in order that the heat of the sun may not dry it.

The sap drops down into a vessel placed to receive it, at the bottom of a circular groove, made below the

(A) The celebrated Linnæus, in his Dissertation on the Sexes of Plants, speaking of the date tree, says, "A female date-bearing palm flowered many years at Berlin without producing any seeds; but the Berlin people taking care to have some of the blossoms of the male tree, which was then flowering at Leipzig, sent to them by the post, they obtained fruit by these means; and some dates, the offspring of this impregnation, being planted in my garden, sprung up, and to this day continue to grow vigorously. Kœmpfer formerly told us, how necessary it was found by the oriental people, who live upon the produce of palm-trees, and are the true *Lotophagi*, to plant some male trees among the females, if they hoped for any fruit: hence it is the practice of those who make war in that part of the world to cut down all the male palms, that a famine may afflict their proprietors; sometimes even the inhabitants themselves destroy the male trees when they dread an invasion, that their enemies may find no sustenance in the country."

Phoenix. the incisions. The milk of the date tree has a sweet and agreeable taste when it is new; it is very refreshing, and it is even given to sick people to drink, but it generally turns sour at the end of 24 hours. Old trees are chosen for this operation, because the cutting of the branches, and the large quantity of sap which flows from them, greatly exhaust them, and often cause them to decay.

The male flowers of the date tree are also useful. They are eaten when still tender, mixed up with a little lemon juice. They are reckoned to be very provocative: the odour which they exhale is probably the cause of this property being ascribed to them.

These date trees are very lucrative to the inhabitants of the desert. Some of them produce 20 bunches of dates; but care is always taken to lop off a part of them, that those which remain may become larger; 10 or 12 bunches only are left on the most vigorous trees.

It is reckoned that a good tree produces, one year with another, about the value of 10 or 12 shillings to the proprietor. A pretty considerable trade is carried on with dates in the interior part of the country, and large quantities of them are exported to France and Italy. The crop is gathered towards the end of November. When the bunches are taken from the tree, they are hung up in some very dry place where they may be sheltered and secure from insects.

Dates afford wholesome nourishment, and have a very agreeable taste when they are fresh. The Arabs eat them without seasoning. They dry and harden them in the sun, to reduce them to a kind of meal, which they lay up in store to supply themselves with food during the long journeys which they often undertake across their deserts. This simple food is sufficient to nourish them for a long time.—The inhabitants of the Zaira procure also from their dates a kind of honey which is exceedingly sweet. For this purpose they choose those which have the softest pulp; and having put them into a large jar with a hole in the bottom, they squeeze them by placing over them a weight of eight or ten pounds.—The most fluid part of the substance, which drops through the hole, is what they call the *honey* of the date.

Even the stones, though very hard, are not thrown away. They give them to their camels and sheep as food, after they have bruised them or laid them to soften in water.

The date, as well as other trees which are cultivated, exhibits great variety in its fruit, with respect to shape, size, quality, and even colour. There are reckoned to be at least twenty different kinds. Dates are very liable to be pierced by worms, and they soon corrupt in moist or rainy weather.

From what has been said, it may easily be perceived, that there is, perhaps, no tree whatever used for so many and so valuable purposes as the date tree.

PHOENIX, in ornithology, a bird famous in antiquity, but generally looked upon by the moderns as fabulous. The ancients speak of this bird as single, or the only one of its kind; they describe it as of the size of an eagle; its head finely crested with a beautiful plumage, its neck covered with feathers of a gold colour, and the rest of its body purple, only the tail white, and the eyes sparkling like stars: they hold,

that it lives 500 or 600 years in the wilderness; that when thus advanced in age, it builds itself a pile of sweet wood and aromatic gums, and fires it with the wasting of its wings, and thus burns itself; and that from its ashes arises a worm, which in time grows up to be a phoenix. Hence the Phœnicians gave the name of *phœnix* to the palm-tree; because when burnt down to the root it rises again fairer than ever.

In the sixth book of the Annals of Tacitus, sect. 28. it is observed that, in the year of Rome 787, the phoenix revisited Egypt; which occasioned among the learned much speculation. This being is sacred to the sun. Of its longevity the accounts are various. The common persuasion is, as we have mentioned above, that it lives 500 years; though by some the date is extended to 1461. The several eras when the phoenix has been seen are fixed by tradition. The first, we are told, was in the reign of Sesostris; the second in that of Amasis; and, in the period when Ptolemy the third of the Macedonian race was seated on the throne of Egypt, another phoenix directed its flight towards Heliopolis. When to these circumstances are added the brilliant appearance of the phoenix, and the tale that it makes frequent excursions with a load on its back, and that when, by having made the experiment through a long tract of air, it gains sufficient confidence in its own vigour, it takes up the body of its father and flies with it to the altar of the sun to be there consumed; it cannot but appear probable, that the learned of Egypt had enveloped under this allegory the philosophy of comets.

PHOENIX, son of Amyntor king of Argos by Cleobule or Hippodamia, was preceptor to young Achilles. His father having proved faithless to his wife, through fondness for a concubine called *Chrysa*, Cleobule, who was jealous of him, persuaded her son Phoenix to ingratiate himself with his father's mistress. Phoenix easily succeeded; but Amyntor discovering his intrigues, he drew a curse upon him, and the son was soon after deprived of his sight by divine vengeance. Some say that Amyntor himself put out his son's eyes, which so cruelly provoked him that he meditated the death of his father. Reason and piety, however, prevailed over passion; and that he might not become a parricide, Phoenix fled from Argos to the court of Peleus king of Phthia. Here he was treated with tenderness; Peleus carried him to Chiron, who restored him to his eye sight; soon after which he was made preceptor to Achilles, his benefactor's son. He was also presented with the government of many cities, and made king of the Dolopes. He went with his pupil to the Trojan war; and Achilles was ever grateful for the instructions and precepts which he had received from him. After the death of Achilles, Phoenix, with others, was commissioned by the Greeks to return in to Greece, to bring to the war young Pyrrhus. This commission he successfully performed; and after the fall of Troy, he returned with Pyrrhus, and died in Thrace. He was buried, according to Strabo, near Trachinæ, where a small river in the neighbourhood received the name of *Phoenix*. There was another Phoenix, son of Agenor, by a nymph who was called *Talassippa*, according to Apollodorus and Moschus, or, according to others, *Ephedusa*, *Parnice*, or *Aphrodisia*. He was, like his brother Cadmus, and Cœus, sent by his

Ph. las.

his father in pursuit of his sister Europa, whom Jupiter had carried away under the form of a bull; and when his inquiries proved unsuccessful, he settled in a country, which, according to some, was from him called *Phenicia*. From him, as some suppose, the Carthaginians were called *Pani*.

Plate
COCCHII.

PHOLAS, a genus of insects, belonging to the order of vermes testacea. The shell is double-valved and divaricated; the cardo is turned backwards, and connected by a cartilage. There are six species, distinguished by the figure of their shells.

The word *pholas* is derived from the Greek, and signifies something which lies hid. This name they derive from their property of making themselves holes in the earth, sand, wood, or stone, and living in them. The means of their getting there, however, are as yet entirely unknown. All that we can know with certainty is, that they must have penetrated these substances when very small; because the entrance of the hole in which the pholas lodges is always much less than the inner part of it, and indeed than the shell of the pholas itself. Hence some have supposed that they were hatched in holes accidentally formed in stones, and that they naturally grew of such a shape as was necessary to fill the cavity.

The holes in which the pholades lodge are usually twice as deep, at least, as the shells themselves are long; the figure of the holes is that of a truncated cone, excepting that they are terminated at the bottom by a rounded cavity, and their position is usually somewhat oblique to the horizon. The openings of these holes are what betray the pholas being in the stone; but they are always very small in proportion to the size of the fish. There seems to be no progressive motion of any animal in nature so slow as that of the pholas; it is immersed in the hole, and has no movement except a small one towards the centre of the earth; and this is only proportioned to the growth of the animal. Its work is very difficult in its motion; but it has great time to perform it in, as it only moves downward, sinking itself deeper in the stone as it increases itself in bulk. That part by means of which it performs this, is a fleshy substance placed near the lower extremity of the shell; it is of the shape of a lozenge, and is considerably large in proportion to the size of the animal; and though it be of a soft substance, it is not to be wondered at that in so long a time it is able, by constant work, to burrow into a hard stone. The manner of their performing this may be seen by taking one of them out of the stone, and placing it upon some soft clay; for they will immediately get to work in bending and extending that part allotted to dig for them, and in a few hours they will bury themselves in the mud in as large a hole as they had taken many years to make in the stone. They find little resistance in so soft a substance; and the necessity of their hiding themselves evidently makes them hasten their work. The animal is lodged in the lower half of the hole in the stone, and the upper half is filled up by a pipe of a fleshy substance and conic figure, truncated at the end: this they usually extend to the orifice of the hole, and place on a level with the surface of the stone; but they seldom extend it any farther than this. The pipe, though it appears single, is in reality composed of two pipes, or at least it is composed of two parts separated

by a membrane. The use of this pipe or proboscis is the same with that of the proboscis of other shell-fish, to take in sea-water into their bodies, and afterwards to throw it out again. In the middle of their bodies they have a small green vessel, the use of which has not yet been discovered. This, when plunged in spirit of wine, becomes of a purple colour: but its colour on linen will not become purple in the sun like that of the murex; and even if it would, its quantity is too small to make it worth preserving.

The pholas is remarkable for its luminous quality. That this fish is luminous was noticed by Pliny, who observes that it shines in the mouth of the person who eats it; and if it touch his hands or clothes, it makes them luminous. He also says that the light depends upon its moisture. The light of this fish has furnished matter for various observations and experiments to M. Reaumur and the Bolognian academicians, especially Beccarius, who took so much pains with the subject of phosphoreal light.

M. Reaumur observes, that whereas other fishes give light when they tend to putrescence, this is more luminous in proportion to its being fresh; that when they are dried, their light will revive, if they be moistened either with fresh or salt water, but that brandy immediately extinguishes it. He endeavoured to make this light permanent, but none of his schemes succeeded.

The attention of the Bolognian academicians was engaged to this subject by M. F. Marilius in 1724, who brought a number of these fishes, and the stones in which they were inclosed, to Bologna, on purpose for their examination.

Beccarius observed, that though this fish ceased to shine when it became putrid, yet that in its most putrid state it would shine, and make the water in which it was immersed luminous when it was agitated. Galeatus and Montius found that wine or vinegar extinguished this light; that in common oil it continued some days, but in rectified spirit of wine or urine hardly a minute.

In order to observe in what manner this light was affected by different degrees of heat, they made use of a Reaumur's thermometer, and found that water rendered luminous by these fishes increased in light till the heat arrived to 45°, but that it then became suddenly extinct, and could not be revived again.

In the experiments of Beccarius, a solution of sea-salt increased the light of the luminous water; a solution of nitre did not increase it quite so much. Sal ammoniac diminished it a little, oil of tartar *per deliquium* nearly extinguished it, and the acids entirely. This water poured upon fresh calcined gypsum, rock crystal, ceruse, or sugar, became more luminous. He also tried the effects of it when poured upon various other substances, but there was nothing very remarkable in them. Afterwards, using luminous milk, he found that oil of vitriol extinguished the light, but that of tartar increased it.

This gentleman had the curiosity to try how differently coloured substances were affected by this kind of light; and having, for this purpose, dipped several ribbons in it, the white came out the brightest, next to this was the yellow, and then the green; the other colours could hardly be perceived. It was not, however,

Pholas.

Pholas,
Pholeys.

however, any particular colour, but only light, that was perceived in this case. He then dipped boards painted with the different colours, and also glass tubes filled with substances of different colours, in water rendered luminous by the fishes. In both these cases, the red was hardly visible, the yellow was the brightest, and the violet the dullest. But on the boards, the blue was nearly equal to the yellow, and the green more languid; whereas in the glasses, the blue was inferior to the green.

Of all the liquors to which he put the pholades, milk was rendered the most luminous. A single pholas made seven ounces of milk so luminous, that the faces of persons might be distinguished by it, and it looked as if it was transparent.

Air appeared to be necessary to this light; for when Beccarius put the luminous milk into glass tubes, no agitation would make it shine unless bubbles of air were mixed with it. Also Montius and Galeatius found, that, in an exhausted receiver, the pholas lost its light, but the water was sometimes made more luminous; which they ascribed to the rising of bubbles of air through it.

Beccarius, as well as Reaumur, had many schemes to render the light of these pholades permanent. For this purpose he kneaded the juice into a kind of paste with flour, and found that it would give light when it was immersed in warm water; but it answered best to preserve the fish in honey. In any other method of preservation, the property of becoming luminous would not continue longer than six months, but in honey it had lasted above a year; and then it would, when plunged in warm water, give as much light as ever it had done. See Barbut's *Genera Verminum*, p. 14. &c.

PHOLEYS, or FOULIES, are a people of Africa, of very peculiar manners. Some authors tell us, that the kingdom of Pholey, from whence they derive their name, is divided from that of Jaloff by a lake called in the language of the Mundingoes *Cayor*; and that it stretches from east to west about 180 miles; but that, though it extends a great way south, its limits in that direction are not exactly ascertained.

Poyre's
Geography,
Vol. I.
p. 442.

Mr Moore, however, gives a very different account, and says, that the Pholeys live in clans, build towns, and are in every kingdom and country on each side the river; yet are not subject to any of the kings of the country, though they live in their territories; for if they are used ill in one nation, they break up their towns, and remove to another. They have chiefs of their own, who rule with such moderation, that every act of government seems rather an act of the people than of one man. This form of government is easily administered, because the people are of a good and quiet disposition, and so well instructed in what is just and right, that a man who does ill exposes himself to universal contempt.

The natives of all these countries, not being avaricious of land, desire no more than they can use; and as they do not plough with horses or other cattle, they can use but very little; and hence the kings willingly allow the Pholeys to live in their dominions, and cultivate the earth.

The Pholeys have in general a tawney complexion, though many of them are of as deep a black as the

Mundingoes; and it is supposed that their alliances with the Moors have given them the mixed colour between the true olive and the black. They are rather of a low stature, but have a genteel and easy shape, with an air peculiarly delicate and agreeable.

Though they are strangers in the country, they are the greatest planters in it. They are extremely industrious and frugal, and raise much more corn and cotton than they consume, which they sell at reasonable rates; and are so remarkable for their hospitality, that the natives esteem it a blessing to have a Pholey town in their neighbourhood; and their behaviour has gained them such reputation, that it is esteemed infamous for any one to treat them in an inhospitable manner. Their humanity extends to all, but they are doubly kind to people of their race; and if they know of any one of their body being made a slave, they will readily redeem him. As they have plenty of food, they never suffer any of their own people to want; but support the old, the blind, and the lame, equally with the others.

These people are seldom angry; and Mr Moore observes that he never heard them abuse each other; yet this mildness is far from proceeding from want of courage, they being as brave as any people of Africa, and very expert in the use of their arms, which are javelins, cutlasses, bows and arrows, and upon occasion guns. They usually settle near some Mungido town, there being scarce any of note up the river that has not a Pholey town near it. Most of them speak Arabic, which is taught in their schools; and they are able to read the Koran in that language, though they have a vulgar tongue called *Pholey*. They are strict Mahometans, and scarce any of them will drink brandy, or any thing stronger than sugar and water.

They are so skilful in the management of cattle, that the Mundingoes leave theirs to their care. The whole herd belonging to a town feed all day in the savannahs, and after the crop is off, in the rice-grounds. They have a place without each town for their cattle, surrounded by a circular hedge, and within this enclosure they raise a stage about eight feet high, and eight or ten feet wide, covered with a thatched roof; all the sides are open, and they ascend to it by a ladder. Round this stage they fix a number of stakes, and when the cattle are brought up at night, each beast is tied to a separate stake with a strong rope made of the bark of trees. The cows are then milked, and four or five men stay upon the stage all night with their arms to guard them from the lions, tygers, and other wild beasts. Their houses are built in a very regular manner, they being round structures, placed in rows at a distance from each other to avoid fire, and each of them has a thatched roof somewhat resembling a high-crowned hat.

They are also great hunters, and not only kill lions, tygers, and other wild beasts, but frequently go 20 or 30 in a company to hunt elephants; whose teeth they sell, and whose flesh they smoke-dry and eat, keeping it for several months together. As the elephants here generally go in droves of 100 or 200, they do great mischief by pulling up the trees by the roots, and trampling down the corn; to prevent which, when the natives have any suspicion of their coming, they make fires round their corn to keep them out.

Pholeys.

Pholis
||
Phormium.

They are almost the only people who make butter, and sell cattle at some distance up the river. They are very particular in their dress, and never wear any other clothes but long robes of white cotton, which they make themselves. They are always very clean, especially the women, who keep their houses exceedingly neat. They are, however, in some particulars very superstitious; for if they chance to know that any person who buys milk of them boils it, they will from thenceforth on no consideration sell that person any more, from their imagining that boiling the milk makes the cows dry.

PHOLIS, in natural history, is the name of a genus of fossils of the class of gypsums or plaster-stones. Its distinguishing characters are, that the bodies of it are tolerably hard, composed of particles somewhat broad, and of a bright crystalline lustre. The name is derived from *pholis*, a *scale* or *small flake*, because they are composed of particles of that form.

The species of this genus are very valuable, and perhaps the most so of all the gypsums, because they burn to the best and finest plaster, but so far as is yet known, there are but two of them: the fine plaster-stone of Montmartre in France, called by us *plaster of Paris stone* and *parget*; and the other, the coarser and somewhat reddish kind, common in many parts of England, and called *ball plaster*. See *PLASTER of Paris*.

PHOLIS, in ichthyology, is the name of a small anguilliform fish. The back is brown, the belly is white, the whole back and sides are spotted, and the skin is soft, free of scales, but with a tough mucilaginous matter like the eel. This species most of all approaches to the *alauda*; and tho' usually larger, yet Mr Ray doubts whether it really differs from it in any thing essential; the distinction is its colour, which though a very obvious is certainly a very precarious one.

PHONICS, the doctrine or science of sounds, otherwise called *Acoustics*. See that article.

PHORMIUM, FLAX-PLANT, (*Phormium tenax*, Forst.) is a name which we may give to a plant that serves the inhabitants of New Zealand instead of hemp and flax. Of this plant there are two sorts; the leaves of both resemble those of flags, but the flowers are smaller, and their clusters more numerous; in one kind they are yellow, and in the other a deep red. Of the leaves of these plants, with very little preparation, they make all their common apparel, and also their strings, lines, and cordage, for every purpose; which are so much stronger than any thing we can make with hemp, that they will not bear a comparison.—From the same plant, by another preparation, they draw long slender fibres, which shine like silk, and are as white as snow: of these, which are very strong, they make their finest cloths; and of the leaves, without any other preparation than splitting them into proper breadths, and tying the strips together, they make their fishing-nets, some of which are of an enormous size.

The seeds of this valuable plant have been brought over into England; but, upon trial, appeared to have lost their vegetating power.

The filamentous parts of different vegetables have been employed in different countries for the same mechanical uses as hemp and flax among us. Putrefaction,

and in some degree alkaline lixivia, destroy the pulpy or fleshy matter, and leave the tough filaments entire. By curiously putrefying the leaf of a plant in water, we obtain the fine-flexible fibres which constituted the basis of the ribs and minute veins, and which form as it were a skeleton of the leaf. In Madagascar, different kinds of cloth are prepared from the filaments of the bark of certain trees boiled in strong ley; and some of these cloths are very fine, and approach to the softness of silk, but in durability come short of cotton: others are coarser and stronger, and last thrice as long as cotton; and of these filaments they make sails and cordage to their vessels. The stalks of nettles are sometimes used for like purposes, even in France; and Sir Hans Sloane relates, in one of his letters to Mr Ray, that he has been informed by several, that muslin and callico, and most of the Indian linens, are made of nettles. A strong kind of cloth is said to be prepared in some of the provinces of Sweden of hop-stalks; and in the Transactions of the Swedish Academy for 1750, we have an account of an experiment relating to this subject: A quantity of the stalks was gathered in autumn, which was equal in bulk to a quantity of flax sufficient to yield a pound after preparation. The stalks were put into water, and kept covered with it during the winter. In March they were taken out, dried in a stove, and dressed as flax. The prepared filaments weighed nearly a pound, and proved fine, soft, and white; they were spun and wove into six ells of fine strong cloth. Unless the stalks are fully rotted, which will take much longer time than flax, the woody part will not separate, and the cloth will prove neither white nor fine.

PHOSPHAT, is a mineral found in Estremadura, It is of a whitish colour, and of great solidity, though not sufficiently hard to strike fire with steel. If triturated in an iron mortar in the dark, or even if two pieces of it be rubbed together, it becomes luminous; but when it has once lost this property, it does not, like some natural phosphori, receive it again by being exposed to the rays of the sun. If reduced to a very fine powder, and laid on coals, it does not decrepitate, but burns with a beautiful green light; though, if the coals be very hot, and the powder coarse, decrepitation will take place.

According to the analysis made by these chemists, 100 grains of the calcareous phosphat is resolvable into the following elements:

| | | | |
|-----------------------|---|---|----------------|
| Carbonic acid | - | - | 1 grain |
| Muriatic acid | - | - | $\frac{1}{2}$ |
| Iron | - | - | 1 |
| Quartzous earth | - | - | 2 |
| Pure calcareous earth | - | - | 59 |
| Phosphoric acid | - | - | 34 |
| Fluoric acid | - | - | $2\frac{1}{2}$ |

100 grains.

We have the following account of an analysis of a native phosphat of lime (earth of bones) by Mr Hassenfratz in the *Annals of Chemistry*. "The phosphat of lime of Estremadura, found by Mr Proust, determined me to examine on the coals a phosphorescent powder which I collected at Kobala-Polyana near

Phormium
Phosphat.

Phosphorus

Sizeth, in the county of Marmarosh, during the metallurgic tour I made through Hungary by command of government. Though this powder gives absolutely the same appearance when treated on the coals as the flint of lime (*spath-fluor*), yet no fluoric acid is disengaged from it when heated with sulphuric acid. It dissolves in nitric acid (dephlogisticated nitrous acid); and sulphuric (vitriolic) acid precipitates from this solution a considerable quantity of sulphat of lime (gypsum): the liquor filtered, and concentrated by evaporation, gives a new precipitate similar to the former. The liquor again filtered, and evaporated to dryness, left a slight residuum. This residuum, after having been exposed to a fire sufficiently strong to make the vessel containing it red-hot, and disengage the nitric and sulphuric acids which might have remained united with it, was soluble in distilled water, which it acidified. This acid did not precipitate barytic muriat; it caused a white precipitate from the solutions of sulphat of iron (green vitriol), and nitrat of mercury (mercurial nitre), and formed a thick and copious one in lime water: hence it is evident, that this acid was the phosphoric, and the powder was phosphat of lime."

The phosphat of soda is obtained by combining the phosphoric acid with the mineral alkali. It has, we are told, been given with success as a purge; and M. Pelletier thinks it may be applied to the soldering of metals instead of borax: and indeed it resembles this substance so much in many of its properties, that it has been supposed that phosphoric acid is one of the constituent principles of borax. See CHEMISTRY, n° 924.

Phosphorus define and distinguish.

PHOSPHORUS, a name given to certain substances which shine in the dark without emitting heat. By this circumstance they are distinguished from the *pyrophori*, which though they take fire on being exposed to the air, are yet entirely destitute of light before this exposure.

Divided into various kinds.

Phosphori are divided into several kinds, known by the names of *Bolognian phosphorus*. Mr Canton's *phosphorus*, *Baldwin's phosphorus*, *phosphorus of urine*, &c. of which the last is by far the most remarkable both with respect to the quantity of light which it emits, and its property of taking fire and burning very fiercely upon being slightly heated or rubbed. For the method of preparing these, see CHEMISTRY-Index.

Divided into two classes.

Besides these, however, it has been found that almost all terrestrial bodies, upon being exposed to the light, will appear luminous for a little time in the dark, metals only excepted. This points out a general division of the phosphori into two classes; namely, such as require to be exposed to the light either of the sun or of some artificial fire, before they become luminous; and such as do not. Of the former kind are the Bolognian phosphorus, Mr Canton's phosphorus, the phosphori from earthen, &c. Of the latter kind are rotten wood, the skins of fishes, and the phosphorus of urine. To these we may add some other substances which become luminous in another way; *viz.* the mass which remains after the distillation of volatile sal ammoniac with chalk, loaf-sugar, and the phosphorus of urine dissolved in spirit of wine. The first, which is a composition of the marine acid of the sal ammoniac with the chalk, after being fused in a crucible, becomes luminous when

struck with any hard body; while sugar is luminous when grated or crushed in the dark; and the solution of phosphorus in spirit of wine is luminous only when dropped into water; and even then the light is only perceived where the drops fall into the liquid. One part of phosphorus communicates this property to 6000 parts of spirit of wine.

There is a remarkable difference between the light of rotten wood, fishes, and that of phosphorus of urine, even when it is not in an ignited state; for the first does not cease to be luminous even when introduced within an exhausted receiver; the contrary of which happens to rotten wood and fishes. If air is strongly blown upon this phosphorus from a pair of bellows, it will extinguish its light for some time, which is not the case with the other kinds. When kept in water, and placed in a warm air, the phosphorus of urine discharges such large and bright flashes into the air above it, as are apt to surprise and even frighten those who are unacquainted with it. These eruptions are contracted in their passage through the water, but expand as soon as they get above it; however, the experiment can only be tried to advantage in warm weather, and in a cylindrical glass not above three quarters filled with water.

The phenomena exhibited by the earthy phosphori are very curious; both on account of the singular circumstances in which they exhibit their light, and the varieties observed in the light itself. All these, as has been already mentioned, emit no light till they have been first exposed to the light of the sun, or some other luminous body. After that, they are luminous in the dark for a considerable time; but by degrees their light dies away, and they emit no more till after another exposure to the sun. But if this happens to be too long continued, they are then irrecoverably spoiled. The same thing will happen from being too much heated without any exposure to light. Indeed, if a phosphorus, which has just ceased to be luminous, be heated, it will again emit light without any exposure to the sun; but by this its phosphoric quality is weakened, and will at last be destroyed. Indeed these phosphori are so tender, and impatient either of light or heat, that the best method of rendering them luminous occasionally is by discharging an electric bottle near them. The light of the flash immediately kindles the phosphorus, and it continues luminous for a considerable time, after which it may again be revived by another flash, and so on. However, with all the care that can be taken, these phosphori are very far from being perpetual; nor has any method been yet fallen upon to render them so.

The singularities in the light of the phosphori above-mentioned are, that they emit light of many different and most beautiful colours. This difference of colours seems to be natural to them; for some will at first emit a green, others a red, others a violet, &c. at their formation. However, the best kinds agree in this strange property, that if they are exposed to a red light, they emit a red light in the dark; and the same of other colours. But this must not be understood without limitation; nor is the phosphoric light at any time so bright as the luminous body, whatever it was, by which it was kindled. Neither are we to imagine, that any particular phosphorus has a parti-

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The explanation of the principal phenomena of phosphorus is deducible from what has been shown concerning the nature of fire, compared with what is mentioned under the article *QUICKLIME*. Under this last article it is shown, that, when calcareous earths are deprived of their fixed air, a proportionable quantity of active fire is absorbed by them; that is, the æthereal fluid which pervades all bodies, has a violent tendency to expand itself, or to act all around every particle of the calcined earth, as from a centre. Of consequence, if this tendency was not counteracted by some other power, these substances would emit a perpetual flame. This power, however, is found in our atmosphere; which has already been shown either to be the positive principle of cold, or to contain it. Hence, the latent fire in these substances is checked, and cannot act, excepting within the very substance itself. But if any other body comes in contact with the calcined earth, in which the principle of cold is less vigorous than in the atmosphere, the active fire in the quicklime immediately shows itself, and the body either becomes hot, or is consumed as if by fire. Hence it will follow, that if a very inflammable body is touched by quicklime, it ought to be set on fire. But of this we have no instance, because it is impossible for the quicklime to part with any of its fire, unless it receives something in exchange. This indeed it might receive from the atmosphere; which could supply it either with more fire, if it was in a state of ignition; or with fixed air, if any substance was at hand to receive the fire. But the atmosphere refuses to part with the fire which it contains, because the effort of the fire in the quicklime is not sufficiently strong to overcome the opposition it meets with in other bodies; and, on the other hand, the effort of the fire in the quicklime is sufficient to keep the earth from attracting fixed air out of the atmosphere. But when water, for instance, is poured on the quicklime, the dry earth absorbs it very greedily, and parts with a proportionable quantity of its latent fire, which the water also absorbs much more readily than the atmosphere. Hence the mixture becomes so exceedingly hot as sometimes to fire combustible bodies. Now if, instead of water, we suppose the lime to be mixed with oil, this also will absorb the fire, but not with such force as the water; neither is the heat by any means so considerable; because oil is capable of detaining a vast quantity of heat in a latent state, the only consequence of which is an increase of its fluidity, without any very perceptible change of temperature. At the same time, however, we must remember, that if the oil is in very small quantity, and intimately combined with the quicklime in that peculiar state which was formerly called *phlogiston*, it is easy to conceive, that it may be so much saturated with fire, as to be unable to contain any more without being ignited. In this case, if more fire is forced into the compound, a quantity of the phlogistic matter which it contains will be decomposed; and of consequence, the fire which it has imbibed will be thrown out, as in the common ignition of vapour; and in proportion to the degree of heat thus communicated, will the degree of ignition

and the continuance of it be. If the quantity of heat is very great, the phlogiston will be dissipated all at once; but if otherwise, the ignition will continue for a much greater length of time, as is the case with a common fire.

To apply this to the accension of phosphori, we must consider that these substances are all formed by calcining calcareous substances, and combining them with some portion of phlogistic matter. Baldwin's phosphorus is made by dissolving chalk in the nitrous acid, afterwards evaporating the solution, and driving off most of the acid. The consequence of this is, that the earth is left in an exceedingly caustic state, as the acid expels the fixed air more completely than could be done almost by any calcination whatever; at the same time that any phlogistic matter which might have been contained in the mixture is most accurately diffused through it, and combined with it. The Bolognian phosphorus is composed of a gypseous earth, which contains a quantity of vitriolic acid; and as no mineral is to be found perfectly free from phlogistic matter, the vitriolic acid unites with it during the calcination into an exceedingly inflammable sulphur; for the greater the quantity of acid there is in proportion to the phlogiston, the more inflammable is the compound*. Thus the Bolognian, as well as Baldwin's phosphorus, is a compound of quicklime and inflammable matter; and the case is still more plain with regard to Mr Canton's, where the quicklime is mixed with sulphur, and both calcined together.—Neither are the phosphori made by calcining oyster-shells without addition to be accounted any way different from those already mentioned; since the shells always contain some portion of inflammable matter, which, being reduced to a coal by the action of the fire, furnishes a quantity of phlogiston, and imparts it to the whole of the calcareous matter.

Having thus seen that the phosphori of which we now speak are all composed of pure calcareous earth and phlogiston, we are next to consider, that the phlogiston must be in such a state as it is when saturated with fire and ready to inflame. It is not indeed in the state of vapour, because this would require a quantity of fire detached from any other substance, and interposed between the particles of the vapour, in order to keep them at a distance, or to give it elasticity. But the fire which ought to do this is confined by the calcareous earth, which also detains the phlogiston itself. As long therefore as the balance is thus preserved, the phosphorus cannot thine; but as soon as a fresh quantity of light is discharged upon it, then more light or fire (for they are the very same in this case) enters the quicklime than it can contain. The consequence of this is, that the quantity which cannot be retained by the earth, exerts its force upon the phlogiston; which having already as much as it can hold, not only the superfluous quantity is discharged, but also part of that which the phlogiston had absorbed before. The burning indeed is very slow and weak, because the phlogiston is obstinately retained by the earth, which both impedes the ignition, and prevents the dissipation of the phlogiston in vapour. However, as soon as the lime has by its action impeded the farther extrication of the phlogiston, the balance is restored, the fire goes out, and the phosphorus ceases to be luminous. Heat

† See the article GOLD.

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will kindle it again; but thus a larger quantity of phosphoric matter is dissipated, and the phosphorus is soon destroyed. Light does the same, but in a much more moderate degree; and therefore the phosphorus may be frequently rekindled by means of light, and will continue its splendor for a long time. But if the light is too long continued, or too violent, it will produce the same consequence whether it is attended with perceptible heat or not.

With regard to the phosphorus of urine, the case is the same; only, instead of the calcareous earth, we have here an acid joined with phlogiston. The latter is in exceeding small quantity, and of consequence so loaded with fire that the least additional heat, rubbing, or alteration in the weather, forces more fire upon it than it can bear, and therefore part of it is continually flashing off in those combustions formerly mentioned. The reason why this phosphorus flashes like lightning, and the others give only a steady light like coals, is, that the compound is very volatile. It requires indeed a violent fire to distil it at first; but in the distillation so much fire is imbibed, that it seems ever afterwards ready to evaporate spontaneously; and therefore phosphorus, when once made, is easily redistilled in close vessels.

It now remains only to show the reason why the phosphorus of urine and some others will shine under water, or in an exhausted receiver, while rotten wood, &c. will not. This seems to arise from the quantity of fire which they have internally, and which requires no supply from the external air, as in the case of common fire; and hence the phosphorus of urine shines more briskly *in vacuo* than in the air; because the pressure of the atmosphere is then taken off, and the evaporation of the phlogistic matter promoted. The light of fishes and rotten wood seems to be of an electric nature; and therefore ceases when the air is exhausted, as on this fluid all the phenomena of electricity are found to depend.

With regard to the various colours of phosphoric light, some have imagined that the earthy substance was capable of imbibing a certain quantity of light, and emitting it afterwards in the very same state, and having the same colour which it had before. But this is now known to be a mistake, and the light of the phosphori is found to be owing to a true accension, though weak, as in other burning bodies. Hence it is very probable that the colour of the light depends upon the degree of accension; for we see that even in common fires the colour depends in a great measure on the strength of the flame. Thus the flame of a candle, where it is not well kindled at bottom, always appears blue. The flame of a small quantity of sulphur, or of spirit of wine, is blue; but if a large quantity of either of these substances be set on fire, the flame will in many places appear white. A strong flame mixed with much smoke appears red; a weak one in similar circumstances appears brown, &c.—Hence if the phosphoric is weakly kindled it will emit a brown, violet, blue, or green flame; if strongly, a red or white one.

It has already been mentioned, that almost all terrestrial bodies have a phosphoric quality: however this, in most of them, is extremely weak, and continues

only for a very short time. Lavoisier and Laplace, who discovered this property, in order to find out what substances were phosphoric and what were not, had a machine contrived like a dark lantern, in which he included himself, in order to perceive with the greater facility any small quantity of light which might be emitted by the substances which he desired to examine. In the side of the machine was a cylinder capable of being turned about without admitting any light. Upon this were piled the substances he designed to examine, and by turning the cylinder he immediately brought them from the light of the fire into intense darkness; in which situation there were but few substances which did not afford a sufficient quantity of light to render themselves visible. This phenomenon, however, is evidently similar to an optical illusion by which we are made to see what is not present before us; for if we look very intently upon any thing for some time, suffering no more light to enter our eyes than what is reflected from that object, we will imagine that we still see it, though we remove into the dark or shut our eyes. The reason of this is, that the nervous fluid being once put in motion after a certain manner, continues that motion for a short space of time after the moving cause is removed. In like manner, as the light is partly reflected from bodies, and partly penetrates them, when any body is exposed to the light, and then is suddenly brought into a dark place, the ethereal fluid within its substance being once put into motion does not cease to move immediately, but for a time produces that vibration which we call light: for the substance of light is present in the most intense darkness as well as in sunshine. Hence almost all substances are capable of emitting light in the dark, after being exposed to a vigorous sunshine; though the reason of their doing so may be very different from that by which the phosphori become luminous.

Many entertaining experiments may be made with the various kinds of phosphori, especially with that of urine. This last, however, is sometimes dangerous on account of the violence with which it burns. If dissolved in oil of cloves, it loses this property, but continues to be as luminous as before; so that this mixture, called *liquid phosphorus*, may be used with safety. As on some occasions it may be wished to have it in powder, it is proper to observe that this may be done with safety by pouring some hot water upon the phosphorus in a glass mortar. The compound melts, and while in a soft state is easily reducible to powder of any degree of fineness.

Mr Margraff endeavoured to combine phosphorus with metals by distillation; but zinc and copper were the only two metals that showed any signs of combination (See *Chemistry*, n. 1413.). The great analogy, however, that has been observed between the properties of phosphorus and those of sulphur and arsenic, induced M. Pelletier long ago to suspect, that phosphorus would really combine with metals, and that the chief point was to retain the phosphorus in contact with the metal in a state of fusion. This happy idea led him to a method from which he has obtained all the metals that could be desired. Of this we have already given a very contracted account under the word *phosphorus*.

Phosphorus in the *Index* to our article CHEMISTRY; we shall now extend that account, by giving that in the first volume of *Annals of Chemistry*.

"Each of the combinations which are now to be described, M. Pelletier has termed *phosphorated metal*.

¹⁷ *Phosphoret of gold.* "M. Pelletier mixed half an ounce of gold of parting, in powder, with an ounce of phosphoric glass and about a dram of powdered charcoal; he put this mixture into a crucible, covering it with a small quantity of charcoal powder; and then applied a degree of heat sufficient to melt the gold. During the operation, a considerable quantity of vapours of phosphorus was disengaged, but all the phosphorus which was produced was not dissipated; a small quantity united with the gold, which was whiter than in its natural state, broke under the hammer, and had also a crystallized appearance.

"Twenty-four grains of this phosphoret of gold, placed on a cupel in a heated muffle, lost only one grain, and the button of gold that remained had the peculiar colour of that metal.

¹⁶ *Of Platina.* "A mixture, consisting of an ounce of platina, an ounce of phosphoric glass, and a dram of powdered charcoal, being put into a crucible, and covered with a little charcoal powder, M. Pelletier gave it a degree of heat nearly equal to what would have fused gold: this he continued for an hour. Having broken the crucible, he found underneath a blackish glass a small button of a silver white, weighing more than an ounce. On the inferior part of the button were well defined crystals of the same substance, the figure of which was a perfect cube. The same experiment, frequently repeated, constantly afforded the same result.

"The phosphoret of platina is very brittle, pretty hard, and strikes fire with steel: it is not acted upon by the magnet, and when it is exposed naked to a fire capable of fusing it, the phosphorus is disengaged, and burns on its surface. Exposed to the fire in a cupelling furnace on porcelain tests, the phosphoret of platina leaves a black glass, which surrounds the metallic substance. The colour of the glass is owing to iron contained in the platina; and if it continue exposed to the same heat in fresh tests, the portions of glass that from latterly have not so deep a colour, are more or less greenish, have sometimes a bluish tinge, and become at last of a transparent white. This observation led M. Pelletier to imagine, that phosphorus was well adapted for separating iron from platina, and that it was one of the best means of separating it entirely from that metal. But the glass which results from the combustion of the phosphorus and its combination with the *oxyd* (calx) of iron, forms a crust which obstructs the combustion of the phosphorus that still remains combined with the platina. To overcome this obstacle, M. Pelletier thought of exposing the phosphoret of platina to the fire, in cupels made of calcined bones, which, as they easily absorb the glass of lead, ought also to have the property of absorbing the phosphoric glass. He repeated the operation, therefore, several times successively, changing the cupel. A button of platina, which had been thus operated on four times, he presented to the academy: in this state it was capable of being reduced into plates, but was brittle when heated.

"Since the reading of his memoir, M. Pelletier has pursued his process, and has advanced so far as to be able totally to free the platina from the phosphorus, so that it may be worked when heated: thus he has procured us a method of purifying this metal more advantageous probably than any hitherto attempted. The phosphoret of platina detonates strongly when it is thrown on nitre in fusion. A mixture of phosphoret of platina, and oxygenated muriat of potash (*dephlogisticated digestive salt*), thrown into a red hot crucible, produces a brisk detonation, and the platina remains pure in the crucible.

¹⁷ *Of Silver.* "Half an ounce of silver, treated with an ounce of phosphoric glass and two drams of charcoal, acquired an increase of weight of one dram. The phosphoret formed was white: it appeared granulated, and as it were crystallized: it broke under the hammer, but was capable of being cut with a knife. Placed in a cupel in a heated muffle, the phosphorus was disengaged, and the silver remained quite pure.

¹⁸ *Of copper.* "In preparing phosphorus in the large way, M. Pelletier observed, that the phosphoric acid attacked in some degree the copper basons, which are in other respects very convenient for this operation; and in the retorts which he made use of for the distillation, he found phosphoret of copper, sometimes in small distinct grains, at others in large masses, according as the degree of heat which finished the operation was more or less intense. This phosphoret he exhibited to the academy, and thence it was mentioned in the chemical nomenclature. The phosphoret of copper is also obtainable by a process similar to that which we have described for obtaining that of gold, silver, and platina. The proportions which M. Pelletier employed were an ounce of shreds of copper, an ounce of phosphoric glass, and a dram of powdered charcoal. This phosphoret appears whitish, is sometimes variegated with the different colours of the rainbow; changes on exposure to the air like pyrites, loses its lustre, and assumes a blackish hue.

"Margraff had formed phosphoret of copper by distilling the oxyd of copper, called *crocus veneris*, with phosphorus; and M. Pelletier also obtained it by the same process: but he did not observe the property attributed to it by Margraff, of running when applied to a candle. Having placed the phosphoret in a cupel in a heated muffle, it was fused, the phosphorus inflamed on its surface; a blackish substance resembling scoriz remained in the cupel, which was penetrated with a glass that gave it a blue colour.

"The phosphoret of iron produced by the fusion of an ounce of phosphoric glass, and an ounce of shreds of iron, mixed with half a dram of powdered charcoal, was very brittle, and broke white, with a striated and granulated appearance: in one cavity it was crystallized in rhomboidal prisms. It is the same substance which Bergman conceived to be a peculiar metal.

"This phosphoret, placed in a cupel in a heated muffle, soon entered into a state of fusion; in the cupel remained a brittle substance, which is an oxyd of iron, and the cupel was penetrated with a matter similar to that which M. Pelletier had observed on treating in the same manner phosphoret of platina, obtained from platina not purified.

"The

Phosphorus 19
Of lead. "The phosphoret of lead, obtained by the process already described, appears little different from common lead. It is malleable, and easily cut with a knife, but it loses its lustre sooner than lead, and when melted on charcoal by the blow pipe, the phosphorus burns, leaving the lead behind.

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Of tin. "The phosphoret of tin, which M. Pelletier obtained by his process, was divided into several grains, because he had not given a sufficient degree of fire to unite them. These grains did not appear different from the metal itself; but being melted with the blow-pipe, the phosphorus burnt on the surface of the metal, as in the similar experiment with lead.

"In fusing tin or lead with the charcoal powder and phosphoric glass, care must be taken not to urge the fire, as the phosphorus easily flies off from either of these metals.

"From the experiments of M. Pelletier, it appears that phosphorus may be combined with gold, platinum, silver, copper, iron, tin, and lead; and that it deprives the five former metals of their ductility. M. Pelletier proposes to make further experiments, to ascertain whether it be possible or not to combine a greater quantity of phosphorus with the two latter, and whether they will retain their malleability in that case. In another memoir he will examine the action of phosphorus on semimetals: he proposes also to ascertain the order of its affinity with the metals and semimetals.

"It is much to be wished that M. Pelletier may carry to perfection a work which will enrich chemistry with a species of combination hitherto almost entirely unknown, and which he has discovered means of effecting by a process equally simple and ingenious."

In the 10th volume of the same Annals we find an account of the action of lime, and of some metallic oxyds on phosphorus, by Dr Raymond.

21
M. Gengembre's discovery of a peculiar kind of gas. 22
The process varied. M. Gengembre discovered, that by boiling phosphorus in a solution of potash, a peculiar kind of gas was produced, which had the singular property of taking fire on coming into contact with the atmosphere, and to which the French chemists have given the appellation of *phosphorized hydrogen gas*. Dr Raymond

thought of varying the process, in order to discover whether this gas might not be produced in some other way. He took two ounces of lime slaked in the air, a dram of phosphorus cut small, with half an ounce of water, which he mixed up into a soft paste, and put into a stone retort; to this retort a tube was fitted, the internal diameter of which, he says, ought not to exceed a line and a half, communicating with a receiver full of water. As soon as the retort was well heated, the phosphorized hydrogen gas was generated so abundantly, that, from the quantity of ingredients here mentioned, no less than three quarts of it were obtained. The residuum was found to have all the characters of the native phosphat of lime. Hence the Doctor supposes, that the water was decomposed during the process, and that its oxygen served to acidify the phosphorus; which, in this state, was combined with the lime, and formed the phosphat; while its hydrogen, assuming a gaseous state, carried with it a part of the phosphorus, to which the property of taking fire by contact with the air must be ascribed. The gas soon loses this property, and the phosphorus is

condensed on the sides of the receiver: great caution, however, is necessary; for though a part of the gas may seem to have deposited its phosphorus, and to be reduced to pure hydrogen, yet another part, in the same receiver, may retain enough to cause a formidable explosion, when in contact with air.

The facility with which water was thus decomposed led the author to suspect that a similar effect might be produced by the same mixture in the mean temperature of the atmosphere. Accordingly he found that in ten days time a small quantity of hydrogen gas was generated in the vials, in which the ingredients were placed: this, however, was not phosphorized, the heat not being sufficient to volatilize the phosphorus.

23
Another variation. Animated by this success, Dr Raymond resolved to try what could be effected by metallic oxyds. He made two mixtures like the former: but instead of lime, he substituted in the one the white oxyd of zinc, and in the other the black oxyd of iron. After long distillation with great heat, he obtained from both phosphorized hydrogen gas: but it was produced in much less time, and in greater quantity, from the oxyd of zinc than from that of iron; which he ascribed to the close affinity of the former to the phosphoric acid.

24
Process for making Kunkel's phosphorus from urine. In the 12th volume of the same valuable work, we have an account of a process for making Kunkel's phosphorus from urine, which is shorter and more economical than that by which Messrs Scheele and Gahn extract it from the bones of animals, by M. Giobert. This method is founded on the property of the metallic salts to separate the phosphoric acid from urine, which Margraff, we believe, first discovered: but M. Giobert has greatly improved on the process directed by the German chemist, as he avoids the tedious and disgusting operations of evaporating the urine, and exposing it to putrefaction. He tells us, that it is indifferent whether the urine be that of healthy or diseased persons; and that of horses is nearly as good for this purpose as that which is human. He gradually pours into it a solution of lead in the nitric acid, till the precipitation ceases which this had occasioned; the whole is then diluted with a considerable quantity of water, and afterward filtrated through a linen cloth. The precipitate, which is phosphat of lead, must be made up into a paste with powder of charcoal, and well dried in an iron or copper pan: it must afterward be distilled; when it will yield, first, an ammoniacal, and then an empyreumatic oil; these oils proceed from the urine, from which it is difficult to purify the phosphat. As soon as the oil ceases to come over, a clean receiver must be applied, and the fire be greatly increased. The phosphorus generally appears in about half an hour; and, within eight hours, twelve or fourteen ounces of it may thus be obtained. If the process be conducted with care, M. Giobert thinks that a hundred parts of phosphat of lead will yield between fourteen and eighteen of phosphorus.

If on the phosphat of lead thus precipitated from urine, a solution of sulphat of ammoniac be poured, and this, after digesting during twelve hours, be filtrated and evaporated, phosphat of ammoniac will be obtained; and if sulphat of soda be used, the result will be phosphat of soda.

Acid of Phosphorus. This acid, called also the *microcymic*

croco-fale acid, has already been described. See CHEMISTRY-Index at *Phosphoric Acid* (A). It has been discovered by Mr Scheele, that an acid capable of making phosphorus is producible from calcined bones or hartshorn and the vitriolic acid. The process for procuring this acid recommended by that gentleman was to dissolve the bones in nitrous acid; afterward to precipitate the earth by means of the vitriolic acid; to filter and evaporate the liquor to dryness; and, after driving off the nitrous acid, the phosphoric acid remains. This process, however, is expensive on account of the waste of nitrous acid; and is likewise very inconvenient, because a great deal of the earthy matter continues dissolved even after the vitriolic acid is poured in; and therefore the phosphoric acid is never to be obtained pure: for which reason the following process is preferable.

Take of calcined bones or hartshorn, one pound; oil of vitriol, 14 ounces. Let the bones be reduced to fine powder; then pour on the acid undiluted, and rub both together till they are as accurately mixed as possible. Having let them remain for some hours in this situation, pour on as much water, stirring and dissolving the lumps, into which the mass will now be concentered, till it is all equally distributed through the liquid, and has the consistence of thick gruel. Let it remain 24 hours, and then pour it into a canvas cloth in order to let the liquid drain from it. This is a very tedious operation, as fresh water must continually be pouring on till all the saline matter is washed off. When this is done, pour into the liquid a quantity of caustic volatile alkali, which will occasion a copious precipitation; for the earth of bones is much less strongly attracted by acids than even the caustic volatile alkali. The liquid being now filtered a second time, which will be done with sufficient ease, and afterwards evaporated, there remains a mass composed of phosphoric acid and vitriolic sal ammoniac. By increasing the fire, the latter is dissipated in vapour; and if the process has been successful, four ounces or more of pure phosphoric acid will remain.

With regard to the properties of this acid, it is not yet ascertained whether they are exactly the same with the microcosmic acid or not. Indeed, as far as yet appears, they seem to be different; and there are very strong reasons for supposing that the phosphoric acid thus produced is no other than the vitriolic altered by its combination with the earth of bones. See the article BONES.

Liquor of Phosphorus. See CHEMISTRY, n^o 2d 957. 1521.

PHOTINIANS, in ecclesiastical history, were a sect of heretics in the fourth century who denied the divinity of our Lord. They derive their name from *Photinus* their founder, who was bishop of Sirmium, and a disciple of Marcellus. Photinus published in the year 343 his notions respecting the Deity, which were repugnant both to the orthodox and Arian systems. He asserted, that Jesus Christ was born of the Holy Ghost and the Virgin Mary; that a certain divine emanation, which he called the *Word*, descended upon Him; and that because of the union of the divine word with his human nature, He was called the son of God, and even God himself; and that the Holy Ghost was not a person, but merely a celestial virtue proceeding from the Deity. Both parties condemned the bishop in the councils of Antioch and Milan, held in the years 345 and 347. He was condemned also by the council at Sirmium in 351, and was afterwards degraded from the episcopal dignity, and at last died in exile in the year 372 or 375. His opinions were afterwards revived by Socinus.

PHOTIUS, patriarch of Constantinople, was one of the finest geniuses of his time, and his merit raised him to the patriarchate; for Bardas having driven Ignatius from the see, Photius was elevated by Albas-tus in 859. He condemned Ignatius in a synod, whereupon the pope excommunicated him, and he, to balance the account, anathematized the pope. Basilus of Macedon, the emperor whom Photius had reproved for the murder of Michael the late emperor, expelled him, and restored Ignatius; but afterwards re-established Photius, upon Ignatius's death, in 878. At last, being wrongfully accused of a conspiracy against the person of Leo the philosopher, son and successor to Basilus, he was expelled by him in 886, and is supposed to have died soon after. He wrote a *Bibliotheca*, which contains an examen of 280 authors: we have also 253 epistles of his; the *Nomocanon* under 14 titles; an abridgment of the acts of several councils, &c. This great man was born in Constantinople, and was descended from a very illustrious and noble family. His natural abilities were very great, and he cultivated them with the greatest assiduity. There was no branch of literature, whether sacred or profane, and scarcely any art or science, in which he was not deeply versed. Indeed he appears to have been by far the greatest man of the age in which he lived; and was so intimately concerned in the chief transactions of it, that ecclesiastical writers have on that account called it *Seculum Photianum*. He was first raised to the chief dignities of the empire, being made principal secretary of state, captain

(A) See particularly n^o 904. In addition to what has been already said on the acid of phosphorus, we may just observe, that M. Pelletier has a memoir on this subject in the 14th volume of the Chemical Annals. This philosopher's method of preparing the phosphorous acid differs little from that which was some years ago proposed by M. Sage, and which, we believe, is now pretty generally known. The principal alterations made by the author of the present memoir consist in his putting each stick of phosphorus into a glass pipe, the lower part of which is shaped like a funnel, terminating in a very small opening; and in covering the apparatus with a tubulated receiver, which he can open at pleasure. By these means he can dissolve a greater quantity of phosphorus without danger of an explosion. His method of converting the phosphorus into the phosphoric acid, by the nitric or the oxygenated muriatic acid, is the same with that discovered by M. Lavoisier, which is described in his *Elements of Chemistry*.

Phreates
Phreatic

captain of the guards, and a senator. In all these stations he acquitted himself with a distinction suitable to his great abilities; for he was a refined statesman, as well as a profound scholar. His rise to the patriarchate was very quick; for when he was chosen to that office he was only a layman: but that he might be as it were gradually raised to that dignity, he was made monk the first day, reader the next, and the following days sub-deacon, deacon, and priest. So that in the space of six days he attained to the highest office in the church. On the whole, however, his ardent love of glory and unbounded ambition made him commit excesses which rendered him a scourge to those about him.

Fabricius calls this *Bibliotheca* or library, *non liber, sed insignis thesaurus*, "not a book, but an illustrious treasure," in which are contained many curious things relating to authors, and many fragments of works which are no where else to be found. It was brought to light by Andreas Schottus, and communicated by him to David Hoekhelius, who caused it to be printed in 1601. Schottus, considering the great utility of this work, translated it into Latin, and printed his translation alone in 1606. The Greek text, together with the translation, were afterwards printed at Geneva in 1611. The last edition of this work, the largest, and the fairest, was printed at Rouen in 1653, folio.

PHRAATES, or **PHRAHATES**. There were four kings of this name in Parthia. See **PARTHIA**.

PHRASE, in grammar, an elegant turn or manner of speech, peculiarly belonging to this or that occasion, this or that art, or this or that language. Thus we say, an Italian *phrase*, an eastern *phrase*, a poetical *phrase*, a rhetorical *phrase*.

PHRASE is sometimes also used for a short sentence or small set or circuit of words constructed together. In this sense, Father Buffier divides phrases into complete and incomplete.

Phrases are *complete* where there is a noun and a verb, each in its proper function; *i. e.* where the noun expresses a subject, and the verb the thing affirmed of it.

Incomplete phrases are those where the noun and the verb together only do the office of a noun; confining of several words without affirming any thing, and which might be expressed in a single word. Thus, *that which is true*, is an incomplete phrase, which might be expressed in one word, *truth*; as, *that which is true satisfies the mind*, *i. e.* *truth satisfies the mind*.

PHRASEOLOGY, a collection of the phrases or elegant expressions in any language. See **PHRASE**.

PHREATIS, or **PHREATTIUM**, in Grecian antiquity, was a court belonging to the civil government of Athens, situated upon the sea-shore, in the Piræus. The name is derived from *πυρρὸν ἕλκος*, because it stood in a pit; or, as others suppose, from the hero *Phreatus*. This court heard such causes as concerned persons who had fled out of their own country for murder, or those that fled for involuntary murder, and who had afterwards committed a deliberate and wilful murder. The first who was tried in this place was Teucer, on a groundless suspicion that he had been accessory to the death of Ajax. The accused was not allowed to come to land, or so much as to cast anchor, but plead-

ed his cause in his bark; and if found guilty, was committed to the mercy of the winds and waves, or, as some say, suffered there condign punishment; if innocent, he was only cleared of the second fact, and, according to custom, underwent a twelve-month's imprisonment for the former. See Potter's *Gr. Ant.* vol. 2. p. 111.

PHRENETIC, a term used to denote those who, without being at all absolutely mad, are subject to such irregularities or imaginations as in some measure pervert their judgment, and cause them to act in a way different from the more rational part of mankind.

PHRENITIS, the same with **PHRENEX**; an inflammation of the meninges of the brain, attended with an acute fever and delirium. See **MENINGES**, n^o 176; also an account of a strange degree of phreny which attacked Charles VI. of France in the article **FRANÇOIS**, n^o 88, 90.

PHYRGANEÆ is a genus of insects, of which Barbut gives the following characters. "The mouth is without teeth, but furnished with four palpi: the stemmata are three in number: the antennæ are filiform, and longer than the thorax. The wings are incumbent; the under ones are folded."

The same author informs us, that the genus is divided into two sections: the first of which is characterized, by having two truncated setæ at the extremity of the abdomen, resembling the beard of an ear of corn; while the second has the abdomen simple, or without appendices. The tarsi of the feet of the first family consist of three articulations; those of the second are composed of five. The wings of this section decline from the inner margin towards the sides, so as to resemble the ridge of a house, and are curved, or turn upwards at their extremity. "This insect (says Mr. Barbut), before it becomes an inhabitant of the air, has lived under-water, lodged in a kind of tube or sheath, the inward texture of which is silk; outwardly covered with sand, straws, bits of wood, shells, &c. When the hexapod worm is about to change to a chrysalis, he stops up the opening of his tube with threads of a loose texture, through which the water makes its way, but prevents the approach of voracious insects. The chrysalis is covered with a thin gauze, through which the new form of the insect is easily discerned. The phyrganea, on the point of changing its element, rises to the surface of the water, leaves its tube, rises into the air, and enjoys the sweets of the country, flutters upon flowers and trees, but is soon called away to the water-side to deposit its eggs; whence proceeds its posterity. These aquatic larvæ are often found in stagnating waters, where they wrap themselves up in the water-lentil, cut out into regular squares, and fitted one to another. Trouts are very greedy of these larvæ; which is the reason, that in some countries, after stripping them of their coats, they make use of them for fishing-baits."

There are a variety of different species of the phyrganea; but except the phyrganea lucida and its allies, they do not materially differ from one another, except in size and colour. The lucida is of a deep dark-brown colour; having a single yellow longitudinal band running across the head and thorax. The legs are of a brown colour, as are the antennæ; which are also long and filiform. Two brown threads, arising from

Phrenetic
Phrenitis

Phrygia. long as the antennæ, terminate the abdomen. The wings, which are about a third longer than the body, are veined with brown fibres, are narrow at the top, broad below, and are as it were stuck upon the body; which they infold, crossing one over the other. This insect, which is met with on the banks of rivers and standing waters, carries its eggs in a cluster at its abdomen, like some spiders.

The *Phrygia* is a large species, of a dun colour, except the eyes, which are black, and has a considerable resemblance to the phalena in the carriage of its wings. The antennæ are as long as the body, and are borne straight forward. The wings are a third larger than the body, having veins of a colour rather deeper than the rest. The feet are large, long, and somewhat finny. Mr Yeats tells us, that the *perla* of Geoffroy, and *phryganæ* of Linnaeus, do not differ generically. It appears, however, from Yeats's experiments, that the *phryganæ* remain longer in the chrysalis than the *perla*.

The lesser *phryganæ* very much resemble the *tinææ*; but, upon examining them with a glass, the former will be found to be covered with small hairs instead of the scales which adorn the wings of the latter.

PHRYGIA, a country in Asia. From whence it derived its name is not certain: some say it was from the river Phryx (now Sarabat), which divides Phrygia from Caria, and empties itself into the Hermus; others from Phrygia, the daughter of Asopus and Europa. The Greek writers tell us, that the country took its name from the inhabitants, and these from the town of Brygium in Macedonia, from whence they first passed into Asia, and gave the name of *Phrygia* or *Brygia* to the country where they settled. Bochart is of opinion that this tract was called Phrygia from the Greek verb *πύρω* "to burn or parch;" which, according to him, is a translation of its Hebrew name, derived from a verb of the same signification.

No less various are the opinions of authors as to the exact boundaries of this country; an uncertainty which gave rise to an observation made by Strabo, viz. that the Phrygians and Mysians had distinct boundaries; but that it was scarce possible to ascertain them. The same writer adds, that the Trojans, Mysians, and Lydians, are, by the poets, all blended under the common name of Phrygians, which Claudian extends to the Pisidians, Bithynians, and Ionians. Phrygia Proper, according to Ptolemy, whom we choose to follow, was bounded on the north by Pontus and Bithynia; on the west by Mysia, Troas, the Ægean Sea, Lydia, Mæonia, and Caria, on the south by Lycia; on the east by Pamphylia and Galatia. It lies between the 37th and 41st degrees of north latitude, extending in longitude from 56 to 62 degrees. The inhabitants of this country, mentioned by Ptolemy, are the Lycaones and Anthemisenii, towards Lycia; and Moccadelis or Moccadum, the Cyddefes or Cydisses towards Bithynia; and between these the Peltini or Speltini, the Moxiani, Phylacenses, and Hierapolitæ. To these we may add the Berecyntes mentioned by Strabo.

Phrygia is commonly divided into the Greater and Lesser Phrygia, called also Troas. But this division

did not take place till Troas was subdued by the Phrygians; and hence it is more considered by some Roman writers as a part of Phrygia, than Bithynia, Cappadocia, or any other of the adjacent provinces. In after ages, the Greater Phrygia was divided into two districts or governments; one called Phrygia Pacatiana, from Pacatianus, who, under Constantine, bore the great office of the præfectus prætorio of the East; the other Phrygia Salutaris, from some miraculous cures supposed to have been performed there by the archangel Michael.

This country, and indeed all Asia Minor, as lying in the fifth and sixth northern climates, was in ancient times greatly celebrated for its fertility. It abounded in all sorts of grain; being, for the most part, a plain country covered with a deep rich soil, and plentifully watered by small rivers. It was in some parts productive of bitumen and other combustible substances. It was well stocked with cattle, having large plains and pasture grounds. The air was anciently deemed most pure and wholesome, though it is now in some parts thought extremely gross, great part of the country lying uncultivated.

In Phrygia Major were anciently several cities of great celebrity; such as APANEA, LAODICEA, HIERAPOLIS, Gordium, &c.—There were also some famous rivers; such as Marsyas, Mæander, &c. The Mæander is now called *Madre* or *Mindre*, and was much celebrated by the ancients for its windings and turnings; from whence all such windings and turnings have been denominated *mæanders*.

The Phrygians accounted themselves the most ancient people in the world. Their origin, however, is extremely dark and uncertain. Josephus and St Jerome say, they were descended from Togarmah, one of Gomer's sons; and that they were known to the Hebrews under the name of Tigrammanes. The Heathen authors derive them from the Brygians, a people of Macedonia. But this is but mere conjecture; and it is a conjecture totally unsupported, except by the similarity of names. Bochart thinks that the Phrygians were the offspring of Gomer the eldest son of Japhet; the word Phrygia being the Greek translation of his name. Josephus makes Gomer the father of the Galatians; but he, by the Galatians, must necessarily mean the Phrygians inhabiting that part of Phrygia which the Galatians had made themselves masters of: the descendants of Gomer being placed by Ezekiel northward of Judæa, near Togarmah (which Bochart takes to be Cappadocia), long before the Gauls passed over into Asia. We are willing to let Gomer enjoy the fine country which Bochart is pleased to give him, and allow him the honour of being the progenitor of the Phrygians, since we know no other person or whom it can be conerred with any degree of probability.

The ancient Phrygians are described as superstitious, voluptuous, and effeminate, without any prudence or forecast, and of such a servile temper, that nothing but stripes and ill usage could make them comply with their duty; which gave rise to several trite and well known proverbs (A). They are said to have been the first inventors of divination by the singing, flying, and feeding

(A) "Phryges sero sapiunt, Phryx verberatus melior, Phryx non minus quam Spyntharus, &c.:" which proverbs

Phrygia. feeding of birds. Their music, commonly called the *Phrygian mood*, is alleged by some as an argument of their effeminacy.

Their government was certainly monarchical; for all Phrygia was, during the reigns of some kings, subject to one prince. Ninnacus, Midas, Manis, Gordius, and his descendants, were undoubtedly sovereigns of all Phrygia. But some time before the Trojan war, we find this country divided into several petty kingdoms, and read of divers princes reigning at the same time. Apollodorus mentions a king of Phrygia contemporary with Ilus king of Troy. Cedrenus and others speak of one Teuthrans, king of a small country in Phrygia, whose territories were ravaged by Ajax, himself slain in single combat, his royal seat laid in ashes, and his daughter, by name Tecmessa, carried away captive by the conqueror. Homer makes mention of Phereys and Alcanius, both princes and leaders of the Phrygian auxiliaries that came to the relief of Troy. Tantalus was king of Sipylus only, and its district; a prince no less famous for his great wealth, than infamous for his covetousness and other detestable vices. That Phrygia was subdued either by Ninus, as Diodorus Siculus informs us, or by the Amazons, as we read in Suidas, is not sufficiently warranted. Most authors that speak of Gordius tell us, that the Phrygians having sent to consult an oracle in order to know how they might put an end to the intestine broils which rent their country into many factions and parties, received for answer, that the most effectual means to deliver themselves and their country from the calamities they groaned under, was to commit the government to a king. This advice they followed accordingly, and placed Gordius on the throne.

As to their commerce, all we can say is, that *Apa-mea* was the chief emporium of all Asia Minor.—Thither resorted merchants and traders from all parts of Greece, Italy, and the neighbouring islands. Besides, we know from Syncellus, that the Phrygians were for some time masters of the sea; and none but trading nations ever prevailed on that element. The country produced many choice and useful commodities, which afforded considerable exports. They had a safe coast, convenient harbours, and whatever may incline us to think that they carried on a considerable trade. But as most of the Phrygian records are lost, we will not dwell on conjectures so difficult to be ascertained.

We have no set form of their laws; and as to their learning, since we are told that for some time they enjoyed the sovereignty of the sea, we may at least allow them a competent skill in geography, geometry, and astronomy; and add to these, from what we

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have said above, a more than ordinary knowledge of music.

Some have been of opinion that the Phrygian language bore a great resemblance to the Greek; but the contrary is manifest from the few Phrygian words which have been transmitted to us, and carefully collected by Bochart and Rudbeckius. To these we may add the authority of Strabo, who, after attempting to derive the name of a Phrygian city from the Greek, concludes, that it is a difficult matter to discover any similitude between the barbarous words of the Phrygian language and the Greek. The Phrygian tongue, after the experiment made by Psimmetchus king of Egypt, was looked upon by the Egyptians as the most ancient language of the world. But other nations, particularly the Scythians, refused to submit to their opinion, as founded on an argument of no real weight. "As the two children (say they) had never heard the voice of any human creature, the word *bec*, or *bekkos*, the first they uttered, was only an imitation of the goats that had suckled them, and happened to be a Phrygian word signifying bread (a).

We have already said, that the Phrygians were superstitious; their idols were consequently very numerous. The chief of these was Cybele, who went by a variety of names. (See CYBELE.) They also worshipped Bacchus under the name of *Sabazius*; and his priests they called *Saloi*.

The history of their kings is dark and uncertain, and the dates of their several reigns and actions cannot now be fixed; we shall refer such of our readers, therefore, as wish to know what is certain respecting them, to the Ancient Universal History, already quoted more than once in the present article. See also GORDIUS, MIDAS, &c. For Phrygia Minor, see TROY.

PHRYGIAN STONE, in natural history, is the name of a stone described by the ancients, and used by them in dying; perhaps from some vitriolic or aluminous salt contained in it, which served to enliven or fix the colours used by the dyers. It was light and spongy, resembling a pumice; and the whitest and lightest were reckoned the best. Pliny gives an account of the method of preparing it for the purpose of dying, which was by moistening it with urine, and then heating it red hot, and suffering it to cool.—This calcination was repeated three times, and the stone was then fit for use. Dioscorides recommends it in medicine after burning; he says it was drying and astringent.

PHRYGIANS, a Christian sect. See CATAPHRYGIANS and MONTANIST.

PHRYNE, was a famous prostitute, who flourished at Athens about 328 years before the Christian era. She was mistress of Praxiteles, who drew her picture,

4 L

which

proverbs intimate their servile temper; and show that they were more fit to bewail misfortunes in an unmanly manner, than to prevent them by proper measures. Their music, too, was suited to their effeminate temper. The Doric mood was a kind of grave and solid music; the Lydian a doleful and lamentable harmony; but the Phrygian chiefly calculated to effeminate and enervate the mind. But this character is contradicted by others.

(a) Coropius Becanus makes use of the same argument, to prove that the High Dutch is the original or mother-tongue of the world, because the word *beker* in that language signifies "a baker."

Phrynicus which was one of his best pieces, and was placed in the temple of Apollo at Delphi. We are told that Apelles painted his Venus Anadyomene after he had seen Phryne on the sea-shore naked, and with dishevelled hair. Phryne became so very rich by the liberality of her lovers, that she offered to rebuild Thebes at her own expence, which Alexander had destroyed, provided this inscription was placed on the walls: *Alexander diruit, sed meretrix Phryne refecit*; which was refused. See *Plin.* 34. c. 8.—There was another of the same name who was accused of impiety. When she found that she was going to be condemned, she unveiled her bosom, which so influenced her judges, that she was immediately acquitted.

PHRYNICUS, a general of Samos, who endeavoured to betray his country, &c.—A flatterer at Athens.—A tragic poet of Athens, disciple to Thepiss. He was the first who introduced a female character on the stage.

PHRYNIS was a musician of Mitylene. He was the first who obtained a musical prize at the Panathenæa at Athens. He added two strings to the lyre, which had always been used with seven by all his predecessors. He flourished about 438 years before the Christian era. We are told that he was originally a cook at the house of Hiero king of Sicily.—There was another of the same name, a writer in the reign of Commodus, who made a collection, in 36 books, of phrases and sentences from the best Greek authors, &c.

PHRYXUS (fab. hist.), was a son of Athamas king of Thebes, by Nephele. When his mother was repudiated, he was persecuted with the most inveterate fury by his step-mother Ino, because he was to sit on the throne of Athamas, in preference to the children of a second wife. His mother apprized him of Ino's intentions upon his life; or, according to others, his preceptor; and the better to make his escape, he secured part of his father's treasures, and privately left Bœotia with his sister Helle, to go to their friend and relation Æetes king of Colchis. They embarked on board a ship, or, as we are informed by the fabulous account of the poets and mythologists, they mounted on the back of a ram, whose fleece was of gold, and proceeded on their journey through the air. The height to which they were carried made Helle giddy, and she fell into the sea. Phryxus gave his sister a decent burial on the sea-shore, and after he had called the place *Helle's point* from her name, he continued his flight, and arrived safe in the kingdom of Æetes, where he offered the ram on the altars of Mars. The king received him with great tenderness, and gave him Chalciope his daughter in marriage. She had by him Phrontis Melas, Argos Cyllindrus, whom some call *Cyturus*. He was afterwards murdered by his father-in-law, who envied him the possession of the golden fleece; and Chalciope, to prevent her children from sharing their father's fate, sent them privately from Colchis to Bœotia, as nothing was to be dreaded there from the jealousy or resentment of Ino, who was then dead. The fable of the flight of Phryxus to Colchis on a ram has been explained by some, who observe, that the ship on which he embarked was either called by that name, or carried on her prow a figure of that

animal. The fleece of gold is accounted for, by observing that Phryxus carried away immense treasures from Thebes. Phryxus was placed among the constellations of heaven after death. The ram which carried him to Asia is said to have been the fruit of Neptune's amour with Theophane the daughter of Atlas. This ram the gods had given to Athamas in order to reward his piety and religious life; and Nephele procured it for her children, just as they were going to be sacrificed to the jealousy of Ino. Phryxus's murder was some time after amply revenged by the Greeks; it having occasioned the famous expedition achieved under Jason and many of the princes of Greece, which had for its object the recovery of the golden fleece, and the punishment of the king of Colchis for his cruelty to the son of Athamas.

PHTHIRIASIS, the LOUSY EVIL; from *phthir*, "a louse." It is a lousy distemper; children are frequently its subjects, and adults are sometimes troubled with it. The increase of lice, when in a warm moist situation, is very great; but a cold and dry one soon destroys them. On the human body four kinds of lice are distinguished: 1. The *pediculi*, so called because they are more troublesome with their feet than by their bite. These are in the heads of children, especially if sore or scabby; and often in those of adults, if they are slothful and natty. 2. Crab-lice, see *CRAB-LICE*. 3. Body lice; these infest the body, and breed in the clothes of the nasty and slothful. 4. A sort which breed under the cuticle, and are found in the hands and feet: they are of a round form, and so minute as often to escape the sight: by creeping under the scurfy skin they cause an intolerable itching; and when the skin bursts where they lodge, clusters of them are found there. See *ACARUS*.

A good diet and cleanliness conduce much to the destruction of lice. When they are in the head, comb it every day; and, after each combing, sprinkle the pulv. sem. staph. agr. or coccul. Ind. among the hairs every night, and confine it with a tight cap.

Codrochius, in his treatise on lice, says, that the powdered coc. Ind. exceeds all other means; and that it may be mixed in the pulp of apple, or in lard, and applied every night to the hair. Some writers assert, that if the pulv. cort. rad. saffra. is sprinkled on the head, and confined with a handkerchief, it destroys the lice in one night.

The body-lice are destroyed by any bitter, sour, salt, or mercurial medicine, if applied to the skin.

The black soap, and the flowers called *cardamine* or *lady's-smock*, are said to be specifics in all cases of lice on the human body.

PTHISIS, a species of consumption, occasioned by an ulcer in the lungs. See *MEDICINE*, n° 237, &c.

Since our article *MEDICINE* was published, Dr Beddoes has suggested † a new theory of pthipsis, founded on the prevailing pneumatic doctrine in chemistry. Thinking that much cannot be gained by adhering to established principles and modes of practice, and being unawed by any pretensions to success from experience, he enters into the province of speculation. He fixes on the effect of pregnancy in suspending the progress of pthipsis, as a fact which, by its mode of operation, might

Phthiriasis.
Phthipsis.

† Observations on the Nature and Cure of Calculus, Scirrhus, &c.

Phthisis. might suggest a method of diminishing the havock occasioned by this distemper. We shall give his explanation of this interesting fact :

"The fœtus has its blood oxygenated by the blood of the mother through the placenta. During pregnancy there seems to be no provision for the reception of an unusual quantity of oxygene. On the contrary, in consequence of the impeded action of the diaphragm, less and less should be continually taken in by the lungs. If, therefore, a somewhat diminished proportion of oxygene be the effect of pregnancy, may not this be the way in which it arrests the progress of phthisis? and if so, is there not an excess of oxygene in the system of consumptive persons? and may we not, by pursuing this idea, discover a cure for this fatal disorder?"

Dr Beddoes thinks, that this supposition is countenanced by the deficiency of oxygene in the blood of pregnant women, of asthmatic patients, and of those who labour under sea fever; and by the superabundance of it in the blood of phthisical persons, indicated by its colour, as well as by the aggravation of the symptoms of consumption by breathing oxygene air, and by the relief from inspiring atmospheric air mixed with carbonic acid air; and, lastly, from the small proportion of deaths among sea-faring people. Supposing acids to act by decomposition, their alleged effects in producing consumption are consistent with the author's doctrine, as well as the emaciation preceding and accompanying phthisis. From these facts, Dr Beddoes concludes, that "1. The phthisical inflammation may so alter the structure of the lungs, as to cause them to transmit a more than ordinary portion of oxygene to the blood; or, 2. Some unknown cause having enabled them to transmit, or the blood itself to attract, more oxygene, an inflammation of the lungs might ensue."

From these principles, the Doctor thinks himself justified in proposing, in a disease which is incurable by present modes of practice, to diminish the supply of oxygene by the two channels through which it is introduced; namely, through the lungs, by lowering the atmospheric air with azotic or hydrogenic air; and through the stomach, by giving such nourishment as contains a small portion of oxygene.

Such is Dr Beddoes's theory of consumption; on which the following remark has been made by a critic* who possesses an equal degree of candour and judgment. It is assumed by Dr Beddoes, that the blood of pregnant women has a diminished proportion of oxygene: but pregnant women have the same circumferential spot of florid red in their countenances which is apparent in hectic. If, then, the presence of this colour be sufficient to prove an excess of oxygene in the one case, it must have the same weight in the other. Another question is, whether less oxygene be really taken in by the lungs during pregnancy? For although the diaphragm be impeded in the freedom of its action, the frequency of breathing is proportionally increased.—A third circumstance which demands attention is, in what degree the fœtus has its blood oxygenated by the blood of the mother through the placenta. It appears highly probable, that the fœtal blood receives a very trifling supply of oxygene from the blood of the mother; that the fœtal heart

contains only a small portion of blood, which has been conveyed to the placenta; and that the blood in the heart and arteries of the fœtus is not florid.—For many ingenious arguments on this subject, we may refer to Mr Colman's Dissertation on suspended Respiration.—Leaving these things to Dr Beddoes's consideration, we will present our readers with his concluding remarks on this subject:

"The more you reflect, the more you will be convinced, that nothing would so much contribute to rescue the art of medicine from its present helpless condition, as the discovery of the means of regulating the constitution of the atmosphere. It would be no less desirable to have a convenient method of reducing the oxygene to 18 or 20 in 100, than of increasing it in any proportion. The influence of the air we breathe is as wide as the diffusion of the blood. The minutest portions of the organs of motion, sense, and thought, must be affected by any considerable change in this fluid. Whether it be that the brain must be washed by streams of arterial blood, or that the action of every organ is a stimulus to the system in general, and consequently to every other organ in particular; it is certain, that when the access of oxygene is cut off from the lungs, the functions of the brain cease: perhaps there may be a mixture of azotic and oxygene airs, more favourable to the intellectual faculties than that which is found in the atmosphere; and hence chemistry be enabled to exalt the powers of future poets and philosophers. That diseases of excitement on the one hand, and debility on the other, might be cured almost solely by a proper air, one can hardly doubt, as well as several disorders at present highly dangerous or desperate, which one cannot, upon the faith of any obvious phenomena, refer to either head. The materia medica might, therefore, undergo a still greater reduction than it has lately undergone, in consequence of the purification of medicine from its grosser absurdities; and hence the treatment of diseases be at once rendered infinitely more pleasant and more efficacious."

Our author, in a subsequent publication*, gives an account of his treating with success several cases of phthisis according to the principles of this theory. *A Treatise on the Cure of Phthisis, &c.* After distinguishing consumptions into two kinds, the florid and the pituitous or catarrhal, he observes, "that the system may be as variously affected by means of the lungs as of the stomach: that it is impossible to doubt that we are nourished by the lungs as truly as by the stomach: and that what we take in at the former entrance, becomes, like our food, a part of the substance of our solids as well as of our fluids. By the lungs we can also introduce essential alterations of the blood, and by consequence of all the parts nourished by the blood."

He then acquaints us more particularly with the apparatus requisite for the practice proposed. 1st, It should be able to turn the azotic, hydrogenic, carbonic, and oxygene airs: our author having, as he says, "no intention to confine himself to one incurable disorder. 2dly, The reservoir should be large, that the patients may be supplied with any quantity that their symptoms may require: and, 3dly, It is necessary to be able to mix these airs with one another, as well as with atmospheric air, in any proportion." These effects, we

Phul
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Phyllis.

told, have been completely attained by a construction not very unlike to that employed in the gazometers of M. Lavoisier and Dr Van Marum.

PHUL, or PUL, king of Assyria, is by some historians said to be Ninus under another name, and the first founder of that monarchy: A renowned warrior. He invaded Israel in the reign of Manahem, who became tributary to him, and paid him 1000 talents of silver for a peace. Flourished 771 B C.

PHUT, or PHUTH, the third son of Ham (Gen x. 6.) Calmet is of opinion, that Phut peopled either the canton of Phtemphu, Phtemphuti, or Phtembuti, set down in Pliny and Ptolemy, whose capital was Thara in Lower Egypt, inclining towards Lybia; or the canton called Phtenotes, of which Buthus was the capital. The prophets often speak of Phut. In the time of Jeremiah, Phut was under the obedience of Necho king of Egypt. Nahum (iii. 9.) reckons up his people in the number of those who ought to have come to the assistance of No-ammon or Diospolis.

PHYLACTERY, in the general, was a name given by the ancients to all kinds of charms, spells, or characters, which they wore about them, as amulets, to preserve them from dangers or diseases.

PHYLACTERY particularly denoted a slip of parchment, wherein was written some text of Holy Scripture, particularly of the decalogue, which the more devout people among the Jews wore on the forehead, the breast, or the neck, as a mark of their religion.

The primitive Christians also gave the name *phylacteries* to the cases wherein they inclosed the relics of their dead.

Phylacteries are often mentioned in the New Testament, and appear to have been very common among the Pharisees in our Lord's time.

PHYLICA, BASTARD ALATERNUS; a genus of the monogynia order, belonging to the pentandria class of plants. There are six species, of which three are kept in the gardens of this country; but, by reason of their being natives of warm climates, they require to be kept in pots, and housed in winter. They are all shrubby plants, rising from three to five or six feet high, and adorned with beautiful clusters of white flowers. They are propagated by cuttings.

PHYLLANTHUS, SEA-SIDE LAUREL; a genus of the triandria order, belonging to the monœia class of plants. There are six species, all of them natives of warm climates; and rise from 12 or 14 feet to the height of middling trees. They are tender, and cannot be propagated in this country without artificial heat.

PHYLLIS (fab. hist.), was a daughter of Sithon, or, according to others, of Lyeurgus king of Thrace, who received Demophoon the son of Theseus; who, at his return from the Trojan war, had stopped on her coasts. She became enamoured of him, and did not find him insensible to her passion. After some months of mutual tenderness and affection, Demophoon set sail for Athens, where his domestic affairs recalled him. He promised faithfully to return as soon as a month was expired: but either his dislike for Phyllis, or the irreparable situation of his affairs, obliged him to violate his engagement: and the queen, grown desperate on account of his absence, hanged herself, or, according to others, threw herself down a precipice into the

sea and perished. Her friends raised a tomb over her body, where there grew up certain trees, whose leaves, at a particular season of the year, suddenly became wet as if shedding tears for the death of Phyllis. According to an old tradition mentioned by Servius, Virgil's commentator, Phyllis was changed by the gods into an almond tree, which is called *phylla* by the Greeks. Some days after this metamorphosis, Demophoon revisited Thrace; and when he heard of the fate of Phyllis, he ran and clasped the tree, which, though at that time stripped of its leaves, suddenly shot forth, and blossomed as if still sensible of tenderness and love. The absence of Demophoon from the house of Phyllis has given rise to a beautiful epistle of Ovid, supposed to have been written by the Thracian queen about the fourth month after her lover's departure.—A country woman introduced in Virgil's eclogues.—The nurse of the emperor Domitian.—A country of Thrace near mount Pangæus.

PHYSALIS, the WINTER CHERRY; a genus of the monogynia order, belonging to the pentandria class of plants. There are 16 species; of which the most remarkable is the alkekengi, or common winter-cherry. This grows naturally in Spain and Italy. The roots are perennial, and creep in the ground to a great distance if they are not confined. These, in the spring, shoot up many stalks, which rise to the height of a foot or more, garnished with leaves of various sorts; some of which are angular and obtuse, some oblong and sharp pointed, with long foot stalks. The flowers are produced from the wings, standing upon slender foot-stalks; are of a white colour, and have but one petal. They are succeeded by round berries about the size of small cherries, inclosed in an inflated bladder, which turns red in autumn, when the top opens and discloses the red berry, which is soft, pulpy, and filled with flat kidney-shaped seeds. Soon after the fruit is ripe, the stalks decay to the root. The plant is easily propagated, either by seeds or parting the roots.

PHYSALUS. See SCOLOPENDRA.

PHYSETER, or SPERMACETI-FISH, in zoology, a genus belonging to the order of cetæ. There are four species; the most remarkable are,

1. The microps, or black-headed cachalot, with a long fin on the back, and the upper jaw considerably longer than the under one. A fish of this kind was cast ashore on Cramond isle, near Edinburgh, December 22. 1769; its length was 54 feet; the greatest circumference, which was just beyond the eyes, 30: the upper jaw was five feet longer than the lower, whose length was ten feet. The head was of a most enormous size, very thick, and above one-third the size of the fish: the end of the upper jaw was quite blunt, and near nine feet high: the spout-hole was placed near the end of it. The teeth were placed in the lower jaw, 23 on each side, all pointing outwards; in the upper jaw, opposite to them, were an equal number of cavities, in which the ends of the teeth lodged when the mouth was closed. One of the teeth measured eight inches long, the greatest circumference the same. It is hollow within-side for the depth of three inches, and the mouth of the cavity very wide: it is thickest at the bottom, and grows very small at the point, bending very much; but in some the flexure is more than in others. These, as well as the teeth of all

Physalis
||
Phylacter.

Physeter. all other whales we have observed, are very hard, and cut like ivory. The eyes are very small, and remote from the nose. The pectoral fins were placed near the corners of the mouth, and were only three feet long: it had no other fin, only a large protuberance on the middle of the back. The tail was a little forked, and 14 feet from tip to tip. The penis seven feet and a half long. Linnaeus informs us, that this species pursues and terrifies the porpoises to such a degree as often to drive them on shore.

2. The catodon, or round headed cachalot, with a fistula in the snout, and having no back-fin. Of this species, 102 of different sizes were cast ashore at one time on one of the Orkney Isles, the largest 24 feet in length. The head is round, the opening of the mouth small. Sibbald says it has no spout-hole, but only nostrils: But Mr Pennant is of opinion, that the former being placed at the extremity of the nose, has been mistaken by him for the latter. Some teeth of this species are an inch and three quarters long, and in the largest part of the thickness of one's thumb. The top is quite flat, and marked with concentric lines; the bottom is more slender than the top, and pierced

with a small orifice: instead of a back fin, there was a rough space.

For the method of extracting the spermaceti from the brain of these creatures, see the article SPERMACETI.

PHYSIC, or **PHYSICK**, the art of healing; properly called **MEDICINE**. The word is formed from the Greek *φύσις*. "nature;" in regard medicine consists principally in the observation of nature. See **PHYSICS** and **MEDICINE**.

PHYSICAL, something belonging to, or really existing in, nature. In this sense we say a physical point, in opposition to a mathematical one, which only exists in the imagination; a physical substance or body, in opposition to spirit, or metaphysical substance, &c.

PHYSICIAN, a person who professes medicine, or the art of healing diseases. See **MEDICINE**.

PHYSICIANS, College of, in London and Edinburgh. See **COLLEGE of Physicians**.

PHYSICO-MATHEMATICS, includes those branches of physic which, uniting observation and experiment to mathematical calculation, undertake to explain the phenomena of nature.

Physic
Phy co-
Mathema-
tics

P H Y S I C S,

¹ **TAKEN** in its most enlarged sense, comprehends the whole study of nature; and **NATURAL PHILOSOPHY** is a term of the same extent: but ordinary language, and especially in this country, employs both of these terms in a much narrower sense, which it is proper in this place to determine with some precision.

² **A more particular explanation of the term.** Under the article **PHILOSOPHY**, we gave a particular account of that view of nature in which the objects of our attention are considered as connected by causation; and we were at some pains to point out the manner in which this study may be successfully cultivated. By a judicious employment of the means pointed out in that article, we discover that the objects of our contemplation compose an **UNIVERSE**, which consists, not of a number of independent existences solitary and detached from each other, but of a number of substances connected by a variety of relations and dependencies, so as to form a whole which may with great propriety be called the **SYSTEM OF NATURE**.

This assembling of the individual objects which compose the universe into one system is by no means the work of a hasty and warm fancy, but is the result of sober contemplation. The natural historian attempts in vain to describe objects, by only informing us of their shape, colour, and other sensible qualities. He finds himself obliged, in describing a piece of marble, for instance, to tell us that it takes a fine polish; that it strikes fire with steel; that it burns to quicklime; that it dissolves in aquafortis, and is precipitated by alkalis; that with vitric acid it makes gypsum, &c. &c. &c. and thus it appears that even the description of any thing, with the view of ascertaining its specific nature, and with the sole purpose of discrimination, cannot be accomplished without

taking notice of its various relations to other things. But what do we mean by the nature of any thing? We are ignorant of its essence, or what makes it that thing and no other thing. We must content ourselves with the discovery of its *qualities* or *properties*; and it is the assemblage of these which we call its *nature*. But this is very inaccurate. These do not constitute its essence, but are the consequences of it. Yet this is all we shall ever know of its nature. Now the term *property* is nothing; but a name expressing some relation which the substance under consideration has to other things. This is true of all such terms. Gravity, elasticity, sensibility, tractitude, and the like, express nothing but certain *matters of fact*, which may be observed respecting the object of our contemplation in different circumstances of situation with regard to other things. Our distinct notions of individuals, therefore, imply their relations to other things.

³ The slightest observation of the universe shows an evident connection between all its parts in their various properties. All things on this earth are connected with each other by the laws of motion and of mind. We are connected with the whole of the solar system by gravitation. If we extend our observations to the fixed stars, the connection seems to fail, but even here it may be observed. Their inconceivable distance, it is true, renders it impossible for us to obtain any extensive information as to their nature. But their bodies are connected with the solar system by the immensity of the light which they emit with that emitted by our sun or any shining body. It moves with the same velocity, it consists (in most of them at least) of the same colours, and it is reflected, refracted, and inflected, according to the same laws.

In this unbounded scene of contemplation, our attention will be directed to the different classes of objects

Introduction

3
A part of
the world
evidently
connected
by gravitation
the solar system
the fixed stars
the connection
seems to fail
but even here
it may be observed

Introduction.

4
Our attention naturally directed in the first instance to our fellow-men.

5
Nature of intention.

jects nearly in proportion to the interest we take in them. There is nothing in which we are so much interested as our fellow men; and one of the first steps that we make in our knowledge of nature, is an acquaintance with them. We learn their *distinctive* nature by attending to their *characteristic* appearances; that is, by observing their actions. We observe them continually producing, like ourselves, certain changes in the situation or condition of surrounding objects; and these changes are evidently directed to certain ends *which respect themselves*. Observing this subserviency of the effects which they produce to their own accommodation, we consider this adjustment of means to ends as the effect of an **INTENTION**, as we experience it to be in our own case, where we are conscious of this intention, and of these its effects. We therefore interpret those actions of other men, where we observe this adjustment of means to ends, as marks or signs of intention in them similar to our own. And thus a quality, or power, or faculty, is *supposed* in them *by means of its sign*, although the quality itself is not *immediately* cognisable by our senses. And as this intention in ourselves is accompanied by perception of external objects, knowledge of their properties, desire of good, aversion from evil, volition, and exertion, without all of which we could not or would not perform the actions which we daily perform, we *suppose* the same perception, knowledge, desire, aversion, volition, and exertion in them.

Thus, by the constitution of our mind, we consider the employment of means, by which ends terminating in the agent are gained, as the natural signs of design or intention. **ART**, therefore, or the employment of means, is the natural sign of intention; and wherever we observe this adjustment of means to ends, we infer the agency of design.

A small acquaintance with the objects around us, obliges us to extend this inference to a great number of beings besides our fellow men, namely, to the whole animal creation: for in all we observe the same subserviency to the ends of the agent, in the changes which we find them continually producing in the objects around them. These changes are all adjusted to their own well being. In all such cases, therefore, we are forced, by the constitution of our own minds, to infer the existence of design or intention in these beings also.

But in numberless changes produced by external objects on each other, we observe no such fitness in the effects, no such subserviency to the well-being of the agent. In such cases, therefore, we make no such inference of thought or design.

6
All objects divided into thinking and unthinking beings.

Thus, then, there is presented to our observation an important distinction, by which we arrange all external objects into two classes. The first resembles ourselves, in giving external marks of that thought or intention of which we are conscious; and we *suppose* in them the other properties which we discover in ourselves, but cannot *immediately* observe in them, viz. thought, perception, memory, foresight, and all that collection of faculties which we feel in ourselves, and which constitute the animal. The other class of objects exhibit no such appearances, and we make no such inference. And thus we divide the whole of external nature into the classes of **THINKING** and **UN-THINKING** beings.

Our first judgments about these classes will be very

inaccurate; and we will naturally ascribe the differences, which we do not very well understand, to the differences in organical structure, which we clearly observe. But when we have knocked down or perhaps smothered an animal, we find that it no longer gives the former marks of thought and intention, and that it now resembles the class of unthinking beings: And yet it still retains all that fineness of organical structure which it had before; it seems only to want the intention and the will. This obliges us to conclude that the distinction does not arise from a difference in organical structure, but from a distinct substance common to all thinking beings, but separable from their organical frame. To this substance we ascribe thought, intention, contrivance, and all that collection of faculties which we feel in ourselves. To this substance in ourselves we refer all sensations, pleasures, pains, remembrances, desires, purposes; and to this aggregate, however imperfectly understood, we give the name **MIND**. Our organical frame, which seems to be only the instrument of information and operation to the mind, we call *our body*.

As the animating principle is not, like our body, the immediate object of the senses, we naturally conceive it to be a substance essentially different from those which are the objects of our senses. The rudest people have shown a disposition to form this conclusion. Observing that animal life was connected with breathing, it was natural to imagine that breathing was living, and that breath was life. It is a remarkable fact, that in most languages the term for expressing *breath* is at least one of the terms for expressing the soul; *רוח*, *πνευμα*, *spiritus*, in the Hebrew, Greek, and Latin, express both; *geist* or *ghost*, in the Teutonic, comes from *gheisen*, to "breathe or sigh;" *dücha* or *düba*, "the soul," in Slavonic, comes from *duchat*, "to breathe;" so in the Gaelic does *anail* come from *anam*; and the same relation is found between the two words in the Malay and other eastern languages. We believe that most persons can recollect some traces of this notion in their early conceptions of things; and many who do not consider themselves as uncultivated, believe that the soul quits the body *along with the last breath*. Among the Tartar nations hanging is considered with particular horror, on account of the ungraceful and filthy exit which the soul is obliged to make from the body.

But the observation of the same appearances of their thought and intention in fishes and other animals which do not breathe, would soon show that this was but a rude conception. Very little refinement indeed is necessary to convince us that air or breath cannot be the substance which thinks, wishes, and designs; and that the properties of this substance, whatever it is, must be totally different from, and incompatible with, any thing that we know of the immediate objects of our senses.

Hence we are led to conclude that there are two kinds of substances in nature: One, which is the principle of sensation; and therefore cannot be the object of our senses, any more than light can be the object of the microscope. This substance alone can feel, think, desire, and propose, and is the object of reflection alone. The objects of our senses compose the other class, and therefore can have none of the other properties which are not cognoscible by the senses. These have all the properties

Introduction.
7
How we come to the knowledge of mind.

8
The nature of mind as understood by mankind in rude ages.

9
Their opinions not just.

10
Of the two kinds of substances in nature, one is the object of reflection alone, the other of the senses.

Introduc-
tion.

Introduc-
tion.

II
The distinc-
tion be-
tween ma-
terial and
immaterial
substances
very im-
portant.

properties which our senses can discover; and we can have no evidence of their having any other, nor indeed any conception of their having them. This class is not confined to the unorganized masses of matter; for we see that the bodies of animals lose after death that organical form, and are assimilated to all the rest of unthinking beings. It has arisen from such views as this, that while all nations have agreed to call this class of objects by the name *BODY*, which originally expresses our organical frame, some nations, farther advanced in cultivation or refinement, have contrived an abstract term to express this general substance of which all inanimate beings are composed. Such a term we have in the words *materies*, *ύλη*.

Matter, then, is that substance which is immediately cognoscible by our senses. Whatever, therefore, is not thus immediately cognoscible by our senses is not material, and is expressed by a negative term, and called *immaterial*: hence it is that mind is said to be immaterial. It is of importance to keep in mind this distinction, merely grammatical. Little more is necessary for detecting the sophisms of Helvetius, Mirabeau, and other sages of the Gallic school, who have been anxious to remove the ties of moral and religious obligation by lowering our conceptions of our intellectual nature. It will also serve to show how huttily they have formed their opinions who have ascribed to the immediate agency of mind all those relations which are observed in the actions of bodies on each other at a distance. The connecting principles of such relations *e distante* (if there are any such), are not the immediate objects of our senses: they are therefore immaterial. But it does not follow that they are minds. There may be many immaterial substances which are not minds. We know nothing of any object whatever but by the observation of certain appearances, which suggest to our minds the existence and agency of its qualities or powers. Such phenomena are the natural signs of these qualities, and it is to those signs that we must always have recourse when we wish to conceive without ambiguity concerning them. What is the characteristic phenomenon of mind, or what is the *distinguishing* quality which brings it into view? It is *INTENTION*: and it may be asserted with the utmost confidence, that we have no other mark by which mind is immediately suggested to us, or that would ever have made us suppose that there existed another mind besides our own. The *phenomenon* by which this quality is suggested to us is *art*, or the employment of means to gain ends; and the mark of art is the supposed conduciveness of these ends to the well-being of the agent. Where this train is not observed, design or intention is never thought of; and therefore where intention is not perceived in any immaterial substance, if any such has ever been observed, it is an abuse of language to call it mind. We do not think that even perception and intelligence intitle us to give the name mind to the substance in which they are inherent, because it is from marks of intention alone that we infer the existence of mind; and although these must be accompanied with perception and intelligence, it does not follow that the substance which can perceive and understand must also desire and propose. However difficult we may find it to separate them, they are evidently separable in imagination. And let not this

assertion be too hastily objected to; for the separation has been made by persons most eminent for their knowledge and discernment. When Leibnitz ascribed to his *MONADES*, or what we call the ultimate *ATOMS* of matter, a perception of their situation in the universe, and a motion precisely suited to this perception, he was the farthest in the world from supposing them animated or endowed with minds. It is true indeed that others, who think and call themselves philosophers, are much more liberal in their application of this term. A modern author of great metaphysical eminence says, "I call that *mind* which moves, and that *body* which is moved." This class of philosophers assert that no motion whatever is begun except by the agency of an animating principle, which (after Aristotle) they call *Nature*, and which has in these days been exalted to the rank of a god. All this jargon (for it is nothing else) has arisen from the puzzle in which naturalists think themselves involved in attempting to explain the production of motion in a body at a distance from that body which is conceived as the cause of this motion. After having been reluctantly obliged, by the reasonings of Newton, to abandon their methods of explaining such phenomena by the impulses of an intervening fluid, nothing seemed left but the assertion that these motions were produced by minds, as in the case of our own exertions. These explanations (if they deserve the name) cannot be objected to in any other way than as an abuse of language, and as the introduction of an unmeaning jargon. We have, and can have, no notion of mind different from those of our own minds; and we discover the existence of other minds as we discover the existence of bodies, by means of phenomena which are characteristic of minds, that is, which resemble those phenomena that follow the exertion of our own mental faculties, that is, by the employment of means to attain selfish ends; and where such appearances are not observed, no existence of a mind is inferred. When we see a man fall from the top of a house, and dash out his brains on the pavement, we never ascribe this motion to his mind. Although the fitness of many of the celestial motions for most important purposes makes us suppose design and contrivance somewhere, and therefore a *Supreme Mind*, we no more think of inferring a mind in the earth from the fitness of its motions for purposes most beneficial to its inhabitants, than of inferring a mind in a bit of bread from its fitness for nourishing our bodies. It is not from the mere motions of animals that their minds are inferred, but from the conduciveness of these motions to the well-being of the animal.

The term mind therefore, in the ordinary language of all men, is applied to what desires and wills at the same time that it perceives and understands. If we call that mind which produces motion, we must derive our notions of its qualities and attributes from observing its effects. We must therefore discover the general desires and laws by which they act, that is, the general laws observed in those motions which we consider as their effects. Now these are the general laws of motion, and in none of these can we find the least resemblance with what we are accustomed to call the laws of mind. Nay, it has been the total want of similarity which has given rise to the distinction which all men, in all ages and

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and countries, have made between mind and matter. This distinction is found in all languages; and it is an unpardonable liberty which men take with languages when they use a *term of distinction*, a *specific term*, to express things of a different species. What these authors have been pleased to call *mind*, the whole world besides have called by another name, *FORCE*; which, though borrowed from our own exertions, is yet sufficiently distinctive, and never leads us to confound things that are different, except in the language of some modern philosophers, who apply it to the laws of the agency of mind; and, when speaking of the force of motives, &c. commit the same mistakes which the followers of Aristotle commit in the use of the term *mind*. *Force*, in the language of these philosophers, means what connects the operations of mind; as *mind*, in the language of Lord Monboddo, is that which connects the operations of body.

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The prin-
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Those are not less to blame who consider this *Nature* of Aristotle, this principle of motion, as an existence or substance different both from matter and from the minds of intelligent creatures. Aristotle calls it in some places *ἀνερ ψυχή*. He might with equal propriety, and equal consistency with his other doctrines, have called mind *ἀνερ ψυχή*, or an *ἀνερ ψυχή*. Besides, we have no evidence for the separability of this *ἀνερ ψυχή* from body—as we have for the separability of such minds as our own, the genuine *ψυχή*. Nay, his whole doctrines, when maturely considered, assume their absolute inseparability.

14
Elemental
minds are
an abuse of
language.

This doctrine of elemental minds, therefore, as the immediate causes of the phenomena of the material world, is an abuse of language. It is a jargon; and it is a frivolous abuse, for it offers no explanation whatever. The phenomena are totally unlike the phenomena of ordinary minds, and therefore receive no explanation from them; and since our knowledge of these *quasi* minds must be derived entirely from the phenomena, it will be precisely the same, although we express it in common language. We shall not indeed raise the wonder of our hearers, as those do who fill the world with minds which they never suspected to exist; but we shall not bewilder their imaginations, confound their ideas, and mislead their judgments.

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We flatter ourselves that our readers will not think these observations unseasonable or misplaced. Of all mistakes that the naturalist can fall into, there is none more fatal to his progress in knowledge than the confounding things which are essentially different; and of all the distinctions which can be made among the objects of our contemplation, there is none of equal philosophical importance with this between mind and matter: And when we consider the consequences which naturally follow from this confusion of ideas, and particularly those which follow from sinking the mental faculties of man to a level with the operations of mechanics or chemistry, consequences which the experience of the present eventful day shows to be destructive of all that is noble or desirable in human nature, and of all that is comfortable in this life, and

which blasts every hope of future excellence—we cannot be too anxious to have this capital distinction put in the plainest point of view, and expressed in the most familiar characters, “so that he who runneth may read.” When we see the frenzy which the reasoning pride of man has raised in our neighbourhood, and hear the dictates of philosophy incessantly appealed to in defence of whatever our hearts shudder at as shocking and abominable; and when we see a man (A), of great reputation as a naturalist, and of professed humanity and political moderation, congratulating his countrymen on the rapid improvement and almost perfection of philosophy; and after giving a short sketch of the constitution of the visible universe, summing up all with a table of elective attractions, and that particular combination and mode of crystallization which constitutes *God* (*horresco referens*!)—is it not full time for us to stop short, and to ask our own hearts “whither are you wandering?”—But sound philosophy, reasoning from effects to their causes, will here listen to the words of our sacred oracles: “By their fruits ye shall know them. Do men gather grapes of thorns, or figs of thistles?” The absurd consequences of the sceptical philosophy of Berkeley and Hume have been thought, by men of undoubted discernment, sufficient reasons for rejecting it without examination. The no less absurd and the shocking consequences of the mechanical philosophy now in vogue should give us the same abhorrence; and should make us abandon its blood-stained road, and return to the delightful paths of nature, to survey the works of God, and feast our eyes with the displays of mind, which offer themselves on every hand in designs of the most extensive influence and the most beautiful contrivance. Following the guidance of heavenly wisdom, we shall indeed find, that “all her ways are ways of pleasantness, and all her paths are peace.”

Such is the scene of our observation, the subject of philosophical study. Its extent is almost unbounded, reaching from an atom to God himself. It is absolutely necessary for the successful cultivation of this immense field of knowledge that it be committed to the care of different cultivators, and that its various portions be treated in different ways: and, accordingly, the various tastes of men have given this curiosity different directions; and the study, like all other tasks, has been promoted by this division of labour.

Some philosophers have attended only to the appearances of fitness which are exhibited in every quarter of the universe; and by arranging these into different classes, and interpreting them as indications of thought and intention, have acquired the knowledge of many classes of sentient and intelligent beings, actuated by propensities, and directed by reason.

While the contemplation of these appearances indicates thought and design in any individual of one of these classes, and brings its propensities and purposes of action, and the ends gained by these actions, into view, the contemplation of these propensities, purposes, and ends, occasions an inference of a much more general

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ral kind. All these intelligent beings give indications of knowledge and of power; but their knowledge bears, in general, no proportion to their power of producing changes in nature, and of attaining important ends; and their power is neither always, nor in the most important cases, the consequence of their knowledge. Where the effect of their actions is most eminently conducive to their important interests, the power of attaining these valuable ends is generally independent on any attention to the fitness of the means, and the exertion is frequently made without even thinking of the important end. The well-being of the individual is secured against any danger from its ignorance, indolence, or inattention, by an instinctive propensity, which leads it to the performance of the necessary action, which is thus made immediately and ultimately desirable, without any regard to its ultimate and important end. Thus, in our own nature, the support of animal life, and the improvement of the means of subsistence by a knowledge of the objects which surround us, are not intrusted to our apprehensions of the importance of these ends, but are committed to the surer guides of hunger and curiosity.

18

There is a connection between the individuals of a class of animals different from that of resemblance.

The same observers discover a connection between the individuals of a class, different from that which arises from the mere resemblance of their external appearance, or even of their propensities and pursuits; the very circumstances which produced the classification. They observe, that these propensities are such, that while each individual seeks only its own enjoyment, these enjoyments are in general such as contribute to the support of the species and the enjoyment of other individuals. Thus, in the classes of animals, and in human nature, the continuance of the race, and the enjoyment of the whole, are not intrusted to the apprehension we entertain of the importance of these ends, but are produced by the operation of sexual love and the love of society.

19

There is also a link of connection between sentient beings of different classes.

The same observers find that even the different classes of sentient beings are connected together; and while the whole of each class aim only at their own enjoyment, they contribute, in some way or other, to the well-being of the other classes. Even man, the selfish lord of this sublunary world, is not the unconnected inhabitant of it. He cannot, in every instance, reap all the fruits of his situation, without contributing to the enjoyment of thousands of the brute creation. Nay, it may be proved to the satisfaction of every intelligent man, that while one race of animals, in consequence of its peculiar propensities, subsists by the destruction of another, the sum total of animal life and enjoyment is prodigiously increased. See a very judicious dissertation on this curious and puzzling subject, intitled *A Philosophical Survey of the Animal Creation*; where it appears that the increase of animal life and enjoyment which is produced by this means, beyond what could possibly obtain without it, is beyond all conception. See likewise the last edition of *King's Origin of Evil*, by Dr Law late bishop of Carlisle.

20

The end of this connection is the accumulation of happiness.

Thus the whole assemblage seems connected, and jointly employed in increasing the sum total of possible happiness. This fitness of the various propensities of sentient and intelligent beings, this subserviency to a general purpose, strikes these observers as a mark of intention, evidently distinct from, and independent of,

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all the particular intentions, and superior to them all; and thus it irresistibly leads them to infer the existence of a SUPREME MIND, directing the whole of this INTELLECTUAL SYSTEM, while the individuals of which it consists appear the unconscious instruments in the hand of a great Artist, with which he executes his grand and beneficent purposes.

But the observation goes yet further. The bodies of the inanimate creation are not only connected with each other by a mutual dependence of properties, and the relation of causation, but they are also connected with the sentient beings by a subserviency to their purposes of enjoyment. The philosopher observes, that this connection is admirably kept up by the constancy of natural operations and the expectations of intelligent beings. Had either of these circumstances been wanting, had either the operations of nature been without rule, or had sentient beings no perception or expectation of their uniformity; the subserviency would be totally at an end. This adjustment, this fitness, of which the effect is the enjoyment of the sentient inhabitants of the universe, appear to be the effect of an intention of which this enjoyment is the final cause. This constancy therefore in the operations of nature, both in the intellectual and material world, and the concomitant expectation of sentient beings, appear the effects of *laws* imposed on the different parts of the universe by the Supreme Mind, who has formed both these classes of beings so admirably suited to each other.

21

To such observers the world appears a WORK OF ART, a system of means employed for gaining certain proposed ends, and it carries the thoughts forward to an ARTIST; and we infer a degree of skill, power, and good intention in this Artist, proportioned to the ingenuity, extent, and happy effect which we are able to discern in his works. Such a contemplation of nature, therefore, terminates in NATURAL THEOLOGY, or the discovery of the existence and attributes of GOD.

22

Our notions of this Supreme Mind are formed from the indications of design which we observe, and which we interpret in the same way as in the actions of men. These notions, therefore, will differ from our notions of other minds only in the degrees which we are able to observe, and which we assign to these faculties; for the phenomenon or the effect is not only the mark, but also the measure of its supposed cause. These degrees must be ascertained by our own capacity of appreciating the extent, the multiplicity, and the variety of the contrivance. Accordingly, the attributes of the Supreme Mind, in the theological creed of a rude Indian, are much more limited than in that of a European philosopher. In proportion as our understandings are enlarged, and as our acquaintance with the operations of nature around us is extended, we shall perceive higher degrees of power, of skill, and of kind intention: and since we find that the scene of observation is unbounded, we cannot affix any boundaries to these attributes in our own imagination, and we are ready to suppose that they are infinite or unbounded in their own nature. When our attentive survey of this universe, and a careful comparison of all its parts, as far as we can understand or appreciate them, have made us conclude that it is *one* design, the work of *one*

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The system
of nature
is govern-
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And we are under the necessity of inferring, that, with respect to *this universe*, his power, wisdom, and benevolence, are indeed infinite.

When men have been led to draw this conclusion from the appearances of fitness which are observed everywhere around them, they consider that constancy which they observe in natural operations, whether in the material or the intellectual system, and that expectation of, and confidence in, this constancy, which renders the universe a source of enjoyment to its sentient inhabitants, as the consequences of laws imposed by the Almighty Artist on his works, in the same manner as they would consider the constancy in the conduct of any people as the consequences of laws promulgated and enforced by the supreme magistrate.

25
The nature
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study of
mind.

There can be no doubt of this view of nature being extremely captivating, and likely to engage the curiosity of speculative men; and it is not surprising that the phenomena of mind have been keenly studied in all ages. This part of the study of nature, like all others, was first cultivated in subserviency to the wants of social life; and the general laws of moral sentiment were the first phenomena which were considered with attention. This gradually ripened into a regular system of moral duty, accompanied by its congenial study, the investigation or determination of the *summum bonum*, or the constituents of human felicity; and these two branches of intellectual science were always kept in a state of association by the philosophers of antiquity. jurisprudence, the science of government, legislation, and politics, were also first cultivated as arts, or at least in immediate subserviency to the demands of cultivated society; and all these so nearly related parts of the study of human nature, had made a very considerable progress, in the form of maxims or precepts, for directing the conduct, before speculative men, out of mere curiosity, treated them as subjects of philosophical study. Our moral sentiments, always involving a feeling of obligation, are expressed in a language considerably different from the usual language of pure philosophy, speaking of things which *ought to be* rather than of things which *are*; and this distinction of language was increased by the very aim of the writers, which was generally to influence the conduct as well as the opinions of their scholars. It was reserved for modern times to bring this study into the pure form of philosophy, by a careful attention to the phenomena of moral sentiment, and classing these according to their generality, and ascertaining their respective ranks by an appeal to experiment, that is, to the general conduct of mankind: and thus it happens that in the modern treatises on ethics, jurisprudence, &c. there is less frequent reference made to the *officia* or duties, or to the constituents of the *summum bonum*, than among the ancients, and a more accurate description of the human mind, and discrimination of its various moral feelings.

27
The origin
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other in-
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It was hardly possible to proceed far in these disquisitions without attending to the powers of the understanding. Differences of opinion were supported by reasonings, or attempts to reasoning. Both sides could not be in the right, and there must be some court of appeals. Rules of argumentation behaved to be acquiesced in by both parties; and it could hardly

escape the notice of some curious minds, that there were rules of truth and falsehood as well as of right and wrong. Thus the human understanding became an object of study, first in subserviency to the demands of the moralists, but afterwards for its own sake; and it gradually grew up into the science of logic. Still further refinement produced the science of metaphysics, or the philosophy of universals. But all these were *in fact* posterior to the doctrines of morals; and disquisitions on beauty, the principles of taste, the precepts of rhetoric and criticism, were the last additions to the study of the phenomena of mind. And now, since the world seems to have acquiesced in the mode of investigation of general laws by experiment and observation, and to agree that this is all the knowledge that we can acquire of any subject whatever, it is to be expected that this branch of philosophical disquisition will attain the same degree of improvement (estimated by the coincidence of the doctrines with fact and experience) that has been attained by some others.

The occupations, however, of ordinary life have oftener directed our efforts towards material objects, and engaged our attention on their properties and relations; and as all sciences have arisen from arts, and were originally implied in the maxims and precepts of those arts, till separated from them by the curiosity of speculation, the knowledge of the material system of nature was possessed in detached scraps by the practitioners in the various arts of life long before the *natural philosopher* thought of collecting them into a body of scientific doctrines. But there have not been wanting in all ages men of curiosity who have been struck by the uniformity of the operations of nature in the material world, and were eager to discover their causes.

Accordingly, while the moralists and metaphysicians turned their whole attention to the phenomena of mind, and have produced the sciences of pneumatology, logic, ethics, jurisprudence, and natural theology, these observers of nature have found sufficient employment in considering the phenomena of the material world.

The bodies of which it consists are evidently constituted by means of those properties by which we observe that they produce changes in each other's situation. This assemblage of objects may therefore be justly called a system. We may call it the MATERIAL SYSTEM. It is frequently termed NATURE; and the terms NATURAL APPEARANCES, NATURAL CAUSES, NATURAL LAWS, have been generally restricted to those which take place in the material system. This restriction, however, is improper, because there is no difference in the manner in which we form our notions of those laws, and reason from them, both with respect to mind and body. Or if there is to be any restriction, and if any part of the study of the universe is to be excluded in the application of these terms, it is that part only which considers moral obligation, and rather treats of what *ought to be* than of what *is*. As has been already observed, there is a considerable difference in the language which must be employed; but still there is none in the principles of investigation. We have no proof for the extent of any moral law but

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but an appeal to the feelings of the hearts of men, indicated by the general laws or facts which are observed in their actions.

But this is only a question of the propriety of language. And no great inconvenience would arise from the restriction now mentioned if it were scrupulously adhered to; but unfortunately this is not always the case. Some authors use the term *natural laws* to express every coincidence of fact; and this is certainly the proper use of the term. The French writers generally use the term *loi physique* in this enlarged sense. But many authors, misled by, or taking advantage of, the ambiguity of language, after having established a law founded on a copious and perhaps unexcepted induction of the phenomena of the material system (in which case it must be considered in its restricted sense), have, in their explanation of phenomena, extended their principle much farther than the induction on which they had founded the existence of the physical law. They have extended it to the phenomena of mind, and have led their followers into great and dangerous mistakes. Languages, like every other production of human skill, are imperfect. They are deficient in terms, and are therefore figurative. The most obvious, the most frequent, and the most interesting uses of language, have always produced the appropriated terms, and the progress of cultivation has never completely supplied new ones. There are certain analogies or resemblances, or certain associations of ideas, so plain, that a term appropriated to one very familiar object will serve to suggest another analogous to it, when aided by the concomitant circumstances of the discourse; and this with sufficient precision for the ordinary purposes of social communication, and without leading us into any considerable mistakes: and it is only the rare and refined disquisitions of the curious speculatist that bring the poverty and imperfection of language into view, and make us wish for words as numerous as our thoughts. There is hardly a sentence, even of common discourse, in which there are not several figures either of single words or of phrases; and when very accurate discrimination is required, it is almost impossible to find words or phrases to express distinctions which we clearly feel. We believe it impossible to express, by the scanty vocabulary of the Hebrews, the nice distinctions of thought which are now familiar to the European philosopher. In nothing does this imperfection of language appear so remarkably as in what relates to mind. Being a late subject of separate discussion, and interesting only to a few speculatists, we have no appropriated vocabulary for it; and all our disquisitions concerning its operations are in continual metaphor or figure, depending on very slight analogies or resemblances to the phenomena of the material world. This makes the utmost caution necessary; and it justifies the British philosophers, who have been the most successful in prosecuting the study of the intellectual system, for having, almost without exception, restricted the terms natural laws, natural causes, natural philosophy, and such like, to the material system. With us pneumatology makes no part of physics. And we may venture to affirm, that the sciences have fared better by the restriction of the terms. In no country has the spirit of liberal discussion been more encouraged and

indulged than in Britain; and her philosophers have been equally eminent in both branches of science. Their performances in ethics, jurisprudence, and natural theology, are considered by all our neighbours as the fountains of knowledge on these subjects; and Locke and Clarke are names no less familiar on the continent than Newton. The licentious and degrading doctrines of the Gallican school have as yet made little impression here; and man is still considered among us as a glorious creature, born to, and fitted for, the noblest prospects.

Physics, then, is with us the study of the material system, including both natural history and philosophy. The term is not indeed very familiar in our language; and in place of *physicus* and *disciplina physica*, we more generally use the terms *naturalist* and *natural knowledge*. The term *natural philosophy*, in its common acceptation, is of less extent. The field of physical investigation is still of prodigious extent; and its different quarters require very different treatments, make very different returns, and accordingly have engaged in their particular cultivation persons of very different talents and tastes. It is of some importance to perceive the distinctions, and to see how the wants and propensities of men have led them into the different paths of investigation; for, as has been more than once observed, all sciences have sprung from the humble arts of life, and both go on improving by means of a close and constant correspondence.

All the phenomena of the material system may be arranged into two classes, distinguished both by their objects and by the proper manner of treating them.

The first class comprehends all the appearances which are exhibited in the *sensible motions* of bodies, and their actions on each other producing *sensible motion*.

The second class comprehends the appearances which are exhibited in the *insensible motions* and actions of the invisible particles of matter.

Of the phenomena of the first class we have examples in the planetary motions, the motions of heavy bodies, the phenomena of impulse, the motions and actions of machines, the pressure and motions of fluids, the sensible actions of magnetical and electrical bodies, and the motions of light.

We have examples of the second class in the phenomena of heat and mixture, and those exhibited in the growth of animals and vegetables, and many phenomena of solid, fluid, magnetical, electrical, and luminous bodies, in which no change of place can be observed.

Thus it appears that there is a distinction in the phenomena sufficiently great to warrant a division of the study, and to make us expect a more rapid improvement by this division. Nay, the division has been made by nature herself, in the acquaintance which men have attained with her operations without study, before science appeared, and while art constituted all our knowledge.

Before man had recourse to agriculture as the most certain means of procuring subsistence, our acquaintance with external substances was principally that of the natural historian; consisting of a knowledge of their fitness for food; medicine, or accommodation, their places of growth or habitation, and the means of

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of agricul-
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procuring them, depending on their manner of life or existence. It required a studied attention to these circumstances to give rise to agriculture, which therefore generally made its appearance after men had been in the practice of keeping flocks; by which means they were more at their ease, and had some leisure to attend to the objects around them, and in particular to those circumstances of soil and weather which affected the growth of their pasture.

When agriculture and a rude medicine were thus established, they were the first *arts* which had their foundation in a *system of laws*, by which the operations of nature were observed to be regulated; and with these arts we may begin the *general study of nature*, which were thus divided into two different branches.

The rude physician would be at first a collector of *specimens*; but by degrees he would observe resemblances among the *operations* of his drugs, and would class them according to these resemblances. He would thus come to attend less to the drug than to its mode of operation; and would naturally speculate concerning the connection between the operation and the economy of animal life. His art now becomes a scientific system, connected by principle and theory, all proceeding on the observation of changes produced by one kind of matter on another, but all out of sight. The frequent recourse to the vegetable kingdom for medicines would cause him to attend much more minutely to the few plants which he has occasion to study than the husbandman can do to the multitude he is obliged to rear. The physician must learn to think, the husbandman to work. An analogy between the economy of animal and vegetable life could hardly fail to engage the attention of the physician, and would make him a botanist, both as a classifier of plants and as a philosopher.

He would naturally expect to unite the services of his drugs by combining them in his recipes, and would be surprised at his disappointments. Curious and unexpected changes would frequently occur in his manipulations: the sensible qualities, and even the external appearances of his simples, would be often changed, and even inverted by their mixture; and their medicinal properties would frequently vanish from the compound, and new ones be induced. These are curious, and to him interesting facts; and he would naturally be inquisitive after the principles which regulate these changes. His skill in this would by degrees extend beyond the immediate use for the knowledge; and the more curious speculatist would lay the foundations of a most extensive and important science, comprehending all the phenomena of heat and mixture.

Along with this, and springing from the same source, another science must arise, contemplating the appearances of animal and vegetable life, and founded on a careful observation and accurate description of the wonderful machine. The most incurious of men have in all ages been affected by the displays of wisdom and contrivance in the bodies of animals, and immediately engaged in investigation into the uses and functions of their various parts and organs. The phenomena have been gradually discriminated and arranged under the various heads of nutrition, concoction, secretion, absorption, assimilation, rejection, growth, life, decay, disease, and death; and, in conformity to the doctrines

which have with greater or less evidence been established on these subjects, the action of medicines, and the whole practice of physic and surgery, has been established in the form of a liberal or scientific art.

The husbandman in the mean time must labour the ground which lies before him. He, too, is greatly interested in the knowledge of the vegetable economy, and forms some systems on the subject by which he regulates his labours: but he sees, that whatever is the nature of vegetable life, he must work hard, and he searches about for every thing which can tend to diminish his labour. The properties of the lever, the wedge, and the inclined plane, soon become familiar to him; and without being able to tell on what their efficacy depends, he uses them with a certain facility and effect. The strength of timber, the pressure and force of water, are daily seen and employed by him, and other artificers who labour for their mutual accommodation; and some rude principles on these subjects are committed to memory. Many tools and simple machines are by this time familiar, and thus the *general* properties of matter, and the general laws of the actions of bodies on each other, become gradually matter of observation and reflection; and the practical mechanic will be frequently improving his tools and machines. The general aim is to produce a greater quantity of work by the same exertion. The attempts to improvement will be awkward, and frequently unsuccessful. When a man finds, that by increasing the length of his lever he increases his power of overcoming a resistance, a small degree of curiosity is sufficient to make him inquire in what proportion his advantage increases. When he finds that a double length gives him a double energy, he will be surprised and mortified to find, that at the end of the day he has not performed twice the quantity of work: but, after much experience, he will learn that every increase of energy, by means of a machine, is nearly compensated by an increase of time in the performance of his task; and thus one of the great and leading principles of practical mechanics was inculcated in a manner not to be forgotten, and the practical mechanic was brought to speculate about motion and force, and by gradual and easy steps the general laws of simple motions were established.

It is evident that these speculations cannot be carried on, nor any considerable knowledge acquired, without some acquaintance with the art of measurement: and the very questions which the mechanic wishes to solve, presuppose some advances in this art, which in process of time refined itself into mathematics, the most perfect of all the sciences. All the phenomena of sensible motion afford employment to the mathematician. It is performed in a double or triple time, through a double or triple space, by a double or triple body, by the exertion of a double or triple force, produces a double or triple effect, is more to the right or to the left, upwards or downwards, &c. In short, every affection of motion is an object of mathematical discussion. Such a science must have appeared ere now in the form of an art, in consequence of the mutual transactions of men. These among an uncultivated people are chiefly in the way of barter. If I want corn from a peasant, and have nothing to give for it but the cloth which I have made, we must fall on some way

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The origin
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of the me-
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The origin
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way of adjusting our terms in respect of the quantity. We should soon discover that the length, and breadth, and depth, of the box or bag, were equally important; and it was not difficult to see, that if any of them were doubled or tripled, the quantity of grain would be so too; if two of them were doubled, the grain would be quadrupled; and if all the three were doubled the quantity of grain would be increased eight times: the same thing would be observed with respect to my cloth. By such tractions as these, a few of the properties of plane and solid numbers and figures would become known, and the operations of multiplication and division, where arithmetic is combined with geometry; and daily observation shows us, that the more abstract properties of number and figure, which to the generality of mankind are so insignificant, lay hold on the fancy of some individuals with such force, as to abstract them from every other intellectual entertainment, and are studied with a keenness and perseverance almost unequalled in any other walk of science. To most men the performance of a machine is a more attractive object than the properties of a figure, and the property of a figure more entertaining than that of a number; but the fact seems to have been otherwise. Before Pythagoras had invented the theorem that bears his name (see PHILOSOPHY, n° 15. and note H.), and which is among the first elements of geometry, he had reformed the Grecian music by the addition of a note to their scale, and this addition proceeds on a very refined speculation on the properties of numbers; so that among the Greeks arithmetic must have made considerable progress, while geometry was yet in its cradle: and we know to what astonishing length they prosecuted the science of pure geometry, while their knowledge of mechanical principles was almost nothing. Also the Arabs hardly made any addition to the geometry of the Greeks, if they did not rather almost completely forget it; whilst they improved their arithmetic into algebra, the most refined and abstracted branch of human knowledge. There is such a distance, in point of simplicity, between pure mathematics and the most elementary mechanics, that the former continued to make rapid steps to improvement in more modern times, while the latter languished in its infancy, and hardly deserved the name of science till very lately, when the great demand for it, by the increase and improvement in manufactures, both interested many in the study, and facilitated its progress, by the multitude of machines which were contriving on all hands by the manufacturers and artificers: and even at present it must be acknowledged, that it is to them that we are indebted for almost every new invention in mechanics, and that the speculatist seldom has done more than improve the invention, by exhibiting its principles, and thus enabling the artist to correct its imperfections; and now science and art go hand in hand, mutually giving and receiving assistance. The demands of the navigator for mathematical and astronomical knowledge have dignified these sciences; and they are no longer the means of elegant amusement alone, but merit the munificence of princes, who have erected observatories, and furnished voyages of discovery, where the mathematical sciences are at the same time cherished and applied to the most important purposes.

This short sketch of what may be called *the natural*

history of physical sciences will not, we hope, be thought improper or unprofitable. It tends to confirm an assertion often alluded to, that the prosecution of the study of nature will be more successful, if we imitate her mode of proceeding, and divide the labour. It will be still further confirmed by attending to the scientific difference of the phenomena, which marks out a different mode of proceeding, and a difference in the knowledge which we shall ultimately acquire, after our most successful researches.

In both classes of phenomena already distinguished (n° 6.) we must grant, that the principle which connects the pairs of concomitant events, rendering the one the inseparable companion of the other, is totally unknown to us, because it is not the immediate object of our perception.

But in the phenomena of the first class, we see the immediate exertion of this principle, whatever it may be; we can observe the exertion with accuracy; we can even determine its kind and degree, which are the signs and measures of the kind and degree of the unperceived cause. This exertion, being always some modification of motion, allows us to call in the aid of mathematical knowledge, and thus to ascertain with the precision peculiar to that science the energy of the cause, judging of the tendency and quantity by the tendency and the quantity of the observed effect.

But in the second class of phenomena the case is very different. In the operations of chemistry, for instance, the immediate exertion of the cause is not perceived: all that we observe is the assentage of particles which obtains before mixture, and that which takes place when it is completed, and which we consider as its result. The procedure of nature in producing the change is unseen and unknown. The steps are hid from our observation. We are not only ignorant of the cause which determines one particle of our food to become a part of our body while others are rejected, but we do not see the operation. We are not only ignorant of the cause which determines a particle of vitriolic acid to quit the fossil alkali with which it is united in Glauber salt, and to attach itself to a particle of magnesia already united with the muriatic acid, which also quits it to unite with the alkali, but we do not see the operation. The particles and their motions are not the objects of our senses; and all that we see is the Epsom salt and common salt separated from the water in which we had formerly dissolved the sal mirabile and the muriated magnesia. The motions, which are the immediate effects of the changing causes, and therefore their only indications, characters, and measures, fitted to show their nature, are hid from our view.

Our knowledge therefore of these phenomena must be less perfect than that of the phenomena of the former class; and we must here content ourselves with the discovery of more remote relations and remote causes, and with our ignorance of the very powers of nature by which these changes are brought about, and which are cognoscible only by their immediate effects, or the motions which they produce unseen. The knowledge which we do really acquire is somewhat similar to what the mechanical philosopher has acquired when he has discovered, by many experiments and investigations, that magnets attract each other by their diffi-

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tion.

40
The connecting principle of concomitant events is totally unknown.

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In the first class, however, we can observe the exertion of this principle; we can even determine its kind and degree, which are the signs and measures of the kind and degree of the unperceived cause. This exertion, being always some modification of motion, allows us to call in the aid of mathematical knowledge, and thus to ascertain with the precision peculiar to that science the energy of the cause, judging of the tendency and quantity by the tendency and the quantity of the observed effect.

42
But not in the second.

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And therefore the phenomena of the former class are more perfectly known than those of the latter.

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milar poles, and repel each other by their similar poles, and do not act at all on any bodies but loadstones and iron. Here we leave undiscovered all that is most curious in the phenomenon, *viz.* how these attractions and repulsions are produced; and even here the mathematical philosopher has the advantage of seeing the agents and the operation.

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But philosophers attending to this circumstance, that, even in these cases, the changes are produced by motions, or consist in motions, however unperceived these may be, have concluded, that the laws according to which nature operates in producing these changes are similar to the laws which regulate her operations in the sensible actions of bodies, or are included in them; and that the motions, though unseen, and the moving forces, are perfectly similar. They have therefore employed similar modes of investigation, applying the laws of impulse, and calling in the aid of mathematical knowledge.

Of this we have many examples in the writings of Dr Freind, Keil, Bernoulli, Hefham, Boerhaave, Hartley, and others, who have delivered theories of fermentation, solution, precipitation, crystallization, nutrition, secretion, muscular action, nay even of sensation and intelligence, founded, as they think, on the laws of motion, and illustrated and supported by mathematical reasoning. Lord Bacon himself, that careful and sagacious distinguisher of intellectual operations, has gone into the same track in his explanation of the phenomena of fire and combustion: and Sir Isaac Newton has made several attempts of the same kind, although with peculiarities which always characterise his discussions, and make them very different from those of an inferior class.

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But their
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But the success of these philosophers has hitherto been very discouraging: indeed they had no title to expect any; for their whole trains of reasoning have proceeded on analogies which were not observed, but assumed or *supposed* without any authority. There is not that similarity in the phenomenon, or in the visible effect, which is absolutely necessary for a successful reasoning by analogy. We do not observe any local motion, any change of place, which alone enables us to reason mathematically on the subject. And to make the case desperate, this ill-founded analogy has been mixed with hypotheses completely gratuitous. Certain forms have been assigned to the particles, and certain modes of action have been laid down for them, for whose reality we have not the least argument or indication: and to complete the matter, these fancied forms and laws of action have been such as are either self contradictory and inconsistent, or they have been such as, if allowed to act in a way analogous to what we observe in the sensible motions of bodies, would produce effects totally different from those which are observed. These atomical theories, as they are called, transgress every rule of philosophical discussion, and even the best of them are little better than trifling amusements. By far the greatest part of them only serve to raise a smile of pity and contempt in every person at all acquainted with mechanical philosophy. Whenever we see an author attempting to explain these hidden operations of nature by invisible fluids, by æthers, by collisions, and vibrations, and particularly if we see him introducing ma-

thematical reasonings into such explanations—the best thing we can do is to shut the book, and take to some other subject. That we may not be thought to speak presumptuously on this occasion, we only beg leave to remind our readers, that the united knowledge of the most eminent mathematicians of Europe has not yet been able to give any thing more than an approximation to the solution of the problem of three bodies; that is, to determine with accuracy the motions of three particles of matter acting on each other in the simplest of all possible manners, *viz.* by forces varying as the squares of the distances inversely: and the vibrations of elastic bodies, of any but the very simplest possible forms, are to this day beyond the reach of investigation. What then should be our expectations in cases where millions of particles are acting at once, of forms unobserved, and with forces unknown, and where the object is not a determination of an average result of many, where the precise state of an individual particle need not be known, but where it is this very precise state of each single particle that we want to know? What can it be but uncertainty and mistake?

Notwithstanding these discouraging circumstances, 46
we must observe that this kind of inquiry has greatly improved of late years, along with the improvement and extension of mathematical philosophy, and since philosophers have given over their incessant attempts to explain every thing by impulse; and we need not despair of making still farther advances, if we will content ourselves with going no farther than Newton has done in his explanation of the planetary motions. He has immortalized his own name, and has added immensely to our stock of useful knowledge: yet he has stopped short at the discovery of the fact of universal gravitation; and all who have endeavoured to explain or account for this fact have only exposed themselves to pity. We may perhaps be one day able to demonstrate from the phenomena that the particles of matter have certain mutual tendencies to or from each other, exerted according to fixed or invariable rules; and from these tendencies we may be able to explain many other phenomena, and predict the consequences, with as much certainty and evidence as an astronomer calculates a future eclipse. This would be a great acquisition, and perhaps more is impossible: and the road to this has been hinted by Sir Isaac Newton, who has expressed his suspicion, that as the great movements of the solar system are regulated by universal gravitation, so the mutual actions of the particles of matter are produced and regulated by tendencies of a similar kind, *equally* but not *more* inexplicable, and of which the laws of action are to be discovered by as careful an attention to the phenomena, and by the same patient thinking, which he has employed on the planetary motions. And a beautiful introduction to this new and almost unbounded field of enquiry has been given us by the celebrated Abbé Boscovich, in his Theory of Natural Philosophy, where he has shown how such mutual tendencies, similar in every ultimate particle of matter, and modified by conditions that are highly probable, nay almost demonstrable, will not only produce the sensible forms of solidity, hardness, elasticity, ductility, fluidity, and vapour, under an inconceivable variety

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Introduc-
tion. variety of subordinate appearances, and the observed laws of sensible motion, but will go far to explain the phenomena of fusion, congelation, solution, crystallization, &c. &c. &c. both in chemistry and physiology. We earnestly recommend this work to the perusal of all who wish to obtain a distinct notion of the internal constitution of natural bodies, and of the way in which the uniting forces produce their ultimate and sensible effects. Any person, possessed of a moderate share of mathematical knowledge, will be convinced that the process of nature is not very different from what he describes; and that much of what we observe must happen as he says, even although the ultimate atoms of matter are not inextended mathematical points, accompanied with attracting and repelling forces.

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But we have many steps to make before we begin this study: Nature opens to us an immense volume; and we doubt not that our posterity will long find employment in the perusal, even though advancing with the celerity and success of the last century. We have not yet arrived at the threshold in many parts of this research: In many parts of chemistry, for instance, we are as yet uncertain with respect to the phenomena themselves, which are to be the subjects of this discussion. The composition of bodies must be fully understood before we begin to speak of the forces which unite their particles, or speculate about their modes of action. As long as water was considered as an element, we were ignorant of the forces inherent in its particles; we are perhaps still ignorant of this; but we now know that they are extremely different from what we formerly supposed them to be. It is but in a very few, if in any, cases of chemical combination, that we even know what are the ingredients: till we know this, it is too soon to speculate about their mode of union. Our ignorance in the real events in the animal and vegetable economy is still greater. Our first task therefore is to proceed, as we are now doing, in the accurate examination and classification of the phenomena themselves: and, without attempting to bring them within the pale of mathematical philosophy, by attempting what are called mechanical explanations, let us give up the consideration of these hidden operations, and augment to the utmost our list of secondary laws of visible but remote connections. All the mechanical speculations of the honourable Robert Boyle about the sensible qualities of things are now forgotten; but his chemical experiments preserve all their value, and are frequently referred to. The same may be said of the sagacious Dr Hales, whose fanciful notions of internal conflicts, and collisions, and vibrations, derogate nothing from the value of the curious facts which he has established both in the animal and vegetable economy.

48 This distinction in the nature of the phenomena, and this difference in the nature of the knowledge which is to be acquired, and the means which are to be employed for the successful prosecution of these two branches of general physics, has occasioned a still farther restriction (at least in Britain) of the term NATURAL PHILOSOPHY. It is particularly applied to the study of the phenomena of the first class, while those of the second have produced the sciences of CHEMISTRY and PHYSIOLOGY.

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tion. Natural philosophy and chemistry have generally been made particular institutions in our seminaries of learning, but physiology has more commonly been taught in conjunction with anatomy, medicine, and botany.

The phenomena of the first class have been usually called MECHANICAL, in order to distinguish them from those observed in the operations of chemistry, and in the animal and vegetable economy: and the explanations which have been attempted of some of the last, by applying the laws observed in the phenomena of the first class, have been called *mechanical explanations*.

As this first class is evidently but a part of general physics, there is some impropriety in giving the name *natural philosophy* to a course of doctrines which is confined to these alone. Indeed at the first institution of universities, the lectures given in the *Scilicet Physica* were much more extensive, comprehending almost all the phenomena of the material world: but as all arts and sciences have improved most where the labour has been most divided, it was found more conducive to the advancement of knowledge that separate institutions should be founded for the studies of natural history, chemistry, physiology, &c.; and thus the phenomena, purely mechanical, and a few others in magnetism, electricity, and optics, which either were susceptible of mathematical treatment, or had little connection with the studies of chemistry and physiology, were left to the care of the professor of natural philosophy.

As the terms *chemistry* and *physiology* have been applied to two very important branches of general physics, we think that a more specific or characteristic name might be appropriated to the other, and that it might very properly be termed MECHANICAL PHILOSOPHY.

It only remains to make a few observations on the distinctive means of prosecuting these studies with success, and to point out some of the advantages which may reasonably be expected from a careful prosecution of them: and as the second branch has been fully treated under the several articles of CHEMISTRY, PHYSIOLOGY, &c. we shall confine ourselves to what is usually called NATURAL PHILOSOPHY.

49 MECHANICAL PHILOSOPHY may, in conformity with Mechanical the foregoing observations, be defined, "the study of the sensible motions of the bodies of the universe, and of their actions producing sensible motions, with the view to discover their causes, to explain subordinate phenomena, and to improve art."

The principle upon which all philosophical discussion proceeds is, that every change which we observe in the condition of things is considered by us as an effect, indicating the agency, characterizing the kind, and measuring the degree, of its cause.

In the language of mechanical philosophy, the cause of any change of motion is called a moving or changing FORCE.

The disquisitions of natural philosophy must therefore begin with the consideration of motion, carefully noticing every affection or quality of it, so as to establish marks and measures of every change of which it is susceptible; for these are the only marks and mea-

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Philosophy.

50
The laws
of motion
and their
application.

lures of the changing forces. This being done, it only remains to apply them to the motions which we observe in the universe.

From the general principle of philosophical discussion already mentioned, there flow directly two axioms.

1. *Every body perseveres in a state of rest or of uniform rectilinear motion, unless affected by some moving force.*

2. *Every change of motion is in the direction and in the degree of the force impressed.*

These are usually called the LAWS OF MOTION. They are more properly laws of human judgment, with respect to motion. Perhaps they are necessary truths, unless it be alleged that the general principle, of which they are necessary consequences, is itself a contingent though universal truth.

By these two axioms, applied in *abstracto* to every variety of motion, we establish a system of general doctrines concerning motions, according as they are simple or compounded, accelerated, retarded, rectilinear, curvilinear, in single bodies, or in systems of connected bodies; and we obtain corresponding characteristics and measures of accelerating or retarding forces, centripetal or centrifugal, simple or compounded.

We have an illustrious example of this abstract system of motion and moving forces in the first book of Sir Isaac Newton's *Mathematical Principles of Natural Philosophy*. Euler's *Mechanica sive Scientia Motus*, Herman's *Phoronomia sive de Viribus Corporum*, and D'Alembert's *Traité de Dynamique*, are also excellent works of the same kind. In this abstract system no regard is paid to the casual differences of moving forces, or the sources from which they arise. It is enough to characterise a double accelerating force, for instance, that it produces a double acceleration. It may be a weight, a stream of water, the pressure of a man; and the force, of which it is said to be double, may be the attraction of a magnet, a current of air, or the action of a spring.

Having established these general doctrines, the philosopher now applies them to the *general* phenomena of the universe, in order to discover the nature of the forces which really exist, and the laws by which their operations are regulated, and to explain interesting but subordinate phenomena. This is the chief business of the mechanical philosopher; and it may with some propriety be called *the mechanical history of nature*.

51
Of the arrangement of the mechanical phenomena of the universe.

Some method must be followed in this history of mechanical nature. The phenomena must be classed by means of their resemblances, which infer a resemblance in their causes, and these classes must be arranged according to some principle. We have seen no method which appears to us less exceptionable than the following.

52
The generality of the phenomena is the principle of arrangement.

The principle of arrangement is the generality of the phenomena; and the propriety of adopting this principle, arises from the probability which it gives us of more readily discovering the most general actuating forces, whose agency is implicated in all other phenomena of less extent; and therefore should be previously discussed, that we may detect the discriminating circumstances which serve to characterise the subordinate

phenomena, and are thus the marks of the distinguishing and inferior natural powers.

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The most general of all phenomena is the curvilinear motion of bodies in free space; it is observed through the whole extent of the solar system.

52
The laws of motion first apply to astronomical phenomena.

The mechanical history of nature begins therefore with astronomy. Here, from the general phenomena of the planetary motions, is evinced the *fact* of the mutual deflection of every body towards every other body, and this in the inverse proportion of the squares of the distance, and the direct proportion of the quantity of matter. This is the fact of UNIVERSAL GRAVITATION, indicating the agency, and measuring the intensity, of the universal force of mutual gravity.

Having established this as an universal fact, the natural philosopher proceeds to point out all the particular facts which are comprehended under it, and whose peculiarities characterise the different movements of the solar system. That is, in the language of philosophy, he gives a theory or explanation of the subordinate phenomena; the elliptical motions of the planets and comets, their mutual disturbances; the lunar irregularities; the oblate figure of the planets; the nutation of the earth's axis; the precision of the equinoxes; and the phenomena of the tides and trade winds: and he concludes with the theory of the parabolic motion of bodies projected on the surface of this globe, and the motion of pendulums.

As he goes along, he takes notice of the applications which may be made to the arts of life of the various doctrines which are successively established; such as chronology, astronomical calculation, dialling, navigation, gunnery, and the measuring of time.

54
The application of this science to the arts of life.

If a square parcel of sand be lying on the table, and the finger be applied to any part of it to push it along the table, that part is removed where you will, but the rest remains in its place; but if it is a piece of sandstone of the same materials and shape, and the finger is applied as before, the whole is moved; the other parts accompany the part impelled by the finger in all its motions.

55
The nature of gravitation.

From the moon's accompanying the earth in all its motions round the sun, we infer a moving force which connects the moon and earth. In like manner, we must conclude that a moving force connects the particles of the stone, for we give the name *force* to every thing which produces motion: We call it the force of COHESION; a term which, like gravitation, expresses merely a fact.

56
And of cohesion.

This seems to be the next phenomenon of the universe in point of extent.

Having, from the general phenomenon, established the existence of this force, the philosopher proceeds to ascertain the laws by which its exertions are regulated; which is the ascertaining its distinctive nature and properties. This he does in the same way that he ascertained the nature of planetary gravitation, *viz.* by observing more particularly the various phenomena.

57
Mode of investigating the laws of cohesion.

Here is opened a most extensive and varied field of observation, in which it must be acknowledged that very little regular and marked progress has been made. The variety in the phenomena, and the consequent variety in the nature of the connecting forces, appear as yet inconceivably great; and there seems little probability

Mechanical Philosophy. bility of our being able to detect in them all any sameness, combined with the other distinguishing circumstances, as we have done in the case of gravity. Yet we should not despair. Boscovich has shown, in the most unexceptionable manner, that although we shall suppose that every atom of matter is endued with a perfectly similar force, acting in a certain determined ratio of the small and imperceptible distances at which the particles of matter are arranged with respect to each other, the external or sensible appearances may, and must, have all that variety which we observe. He also shows very distinctly how, from the operation of this force, must arise some of the most general and important phenomena which characterise the different forms of tangible bodies.

We observe the chief varieties of the action of this CORPUSCULAR force on the bodies which we denominate *hard, soft, solid, fluid, vaporous, brittle, ductile, elastic*. We see instances where the parts of bodies avoid each other, and require external force to keep them together, or at certain small distances from each other. This is familiar in air, vapours, and all compressible and elastic bodies.

This is evidently a most curious and interesting subject of investigation. On the nature and action of these corpuscular forces depends the strength or firmness of solids, their elasticity, their power of communicating motion, the pressure, and motion, and impulse of fluids; nay, on the same actions depend all the chemical and physiological phenomena of expansion, fusion, congelation, vaporisation, condensation, solution, precipitation, absorption, secretion, fermentation, and animal and vegetable concoction and assimilation.

Out of this immense store of phenomena, this inexhaustible fund of employment for our powers of investigation, the natural philosopher selects those which lead directly to the production or modification of sensible motion.

He will therefore consider,

58 The production of motion by impulse has been thought the most familiar fact in nature. 1. The communication of motion among detached and free bodies, establishing the laws of impulse or collision. This has always been considered as the elementary doctrine of mechanical philosophy, and as the most familiar fact observed in the material world; and in all ages philosophers have been anxious to reduce all actions of bodies on each other to impulse, and have never thought a phenomenon completely explained or accounted for till it has been shown to be a case of impulse. This it is which has given rise to the hypotheses of vortices, ethers, magnetic and electric fluids, animal spirits, and a multitude of fancied intermediaries between the sensible masses of matter, which are said in common language to act on each other. A heavy body is supposed to fall, because it is impelled by a stream of an invisible fluid moving according to certain conditions suited to the case. The filings of iron are supposed to be arranged round a magnet, by means of a stream of magnetic fluid issuing from one pole, circulating perpetually round the magnet, and entering at the other pole, in the same manner as we observe the stote grafs arranged by the current of a brook.

59 But this opinion is very questionable. But the philosopher who has begun the mechanical study of nature by the abstract doctrines of dynamics, and made its first application to the celestial phenomena, and who has attended carefully to the many ana-

Mechanical Philosophy. logies between the phenomena of gravitation and cohesion, will be at least ready to entertain very different notions of this matter. He will be so far from thinking that the production of motion by impulse is the most familiar fact in nature, that he will acknowledge it to be comparatively very rare; nay, there are some appearances in the facts which are usually considered as instances of impulsions, which will lead him to doubt, and almost to deny, that there has ever been observed an instance of one body putting another in motion by coming into absolute contact with it, and striking it; and he will be disposed to think that the production of motion in this case is precisely similar to what we observe when we gently push one floating magnet towards another, with their similar poles fronting each other. There will be the same production of motion in the one and diminution of it in the other, and the same uniform motion of the common centre of gravity: and, in this case of the magnets, he sees completely the necessity of a law of motion, which is not an axiom, but is observed through the whole of nature, and which receives no explanation from any hypothesis of an intervening fluid, but is even totally inconsistent with them. We mean, "that every action of one body on another is accompanied by an equal and opposite action of that other on the first." This is usually called the *equality of action and reaction*: it is not intuitive, but it is universal; and it is a necessary consequence of the perfect similarity of the corpuscular forces of the same kinds of matter. This general fact, unaccountable on the hypothesis of impelling fluids, is considered in the planetary motions as the unequivocal indication of the sameness of that gravity which regulates them all. The rules of good reasoning should make us draw the same conclusion here, that the particles of tangible matter are connected by equal and mutual forces, which are the *immediate causes* of all their sensible actions, and that these forces, like gravitation, vary with every change of distance and situation.

60 Motion seems to be produced from the equality of action and reaction. The laws of collision and impulsion being now established, either as original facts or as consequences of the agency of equal and mutual forces which connect the particles of matter, the philosopher considers, 2. The production of motion by the intervention of solid bodies, where, by reason of the cohesion of matter, some of the motions are necessarily confined to certain determinate paths or directions. This is the case in all motions round fixed points or axes, or along planes or curves which are oblique to the action of the forces.

61 Of motion as it respects the theory of machines, &c. This part of the study contains the theory of machines, pointing out the principles on which their energy depends, and consequently furnishing maxims for their construction and improvement. But these observations do not complete the discussion of the mechanism of solid bodies: they are not only solid and inert, but they are also heavy; therefore the action of gravity must be combined with the consequences of solidity. This will lead to discussions about the centre of gravity, the theory and construction of arches and roofs, the principles of stability and equilibrium, the attitudes of animals, and many particulars of this kind.

62 Mechanics. 3. The philosopher will now turn his attention to another form, in which tangible matter exhibits many interesting phenomena, *viz. FLUIDITY*. The first thing

The nature and definition of fluidity. 4 N 10

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Philosophy.

to be attended to here is, *What is that particular form of existence?* What is the precise phenomenon which characterises fluidity? What is the definition of a fluid? This is by no means an easy question, and considerable objections may be stated against any definition that has been given of it. Sir Isaac Newton says, that *a fluid is a body whose particles yield to the smallest impression, and by so yielding are easily moved among themselves.* It may be doubted whether this be sufficiently precise; what is meant by the *smallest impression?* and what is *easily moving?* Is there any precise degree of impression to which they do not yield; and do they oppose any resistance to motion? And a stronger objection may be made: It is not clear that a body so constituted will exhibit all the appearances which a body acknowledged to be fluid does readily exhibit. Euler offers some very plausible reasons for doubting whether it will account for the horizontal surface, and the complete propagation of pressure through the fluid in every direction; and therefore prefers selecting *this last phenomenon*, the propagation of pressure *quicquid-versum*, as the characteristic of fluidity, because a body having this constitution (on whatever circumstances it may depend) will have every other observed property of a fluid. But this definition is hardly simple or perspicuous enough; and we think that the objections against Newton's more simple and intelligible definition are not unanswerable. Boscovich defines a fluid to be, *a body whose particles exert the same mutual forces in all directions*; and shows, that such particles must be indifferent, as to any position, with respect to each other. If no external force act on them, they will remain in every position, and will have no tendency to arrange themselves in one position rather than another; differing in this respect from the particles of solid, or soft, or viscid bodies; which require some force to change their respective positions, and which recover these positions again when but gently disturbed. He illustrates this distinction very beautifully, by comparing a parcel of balls thrown on quicksilver, and attracting each other, with a parcel of magnets in the same situation. The balls will stick together, but *in any position*; whereas the magnets will always affect a particular arrangement.

64
Of the pressure and equilibrium of fluids, or hydrostatics.

When the characteristic phenomenon of fluidity has been selected, the philosopher proceeds to combine this property with gravity, and establishes the doctrines of HYDROSTATICS, or of the pressure and equilibrium of heavy fluids, the propagation of this pressure in every direction; and demonstrates the horizontality of surface assumed by all perfect fluids.

These doctrines and principles enable us to determine several very interesting circumstances respecting the mutual pressure of solids and fluids on each other; the pressures exerted on the bottoms and sides of vessels; the support and whole mechanism of floating bodies, &c.

65
Of the motion of fluids, or hydraulics.

He then considers how fluids will move when their equilibrium of pressure is destroyed; and establishes the doctrines of HYDRAULICS, containing all the modifications of this motion, arising from the form of the vessels, or from the intensity or direction of the pressure which occasions it. And this subject is completed by the consideration of the resistance which fluids oppose to the motion of solid bodies through them, and their impulse on bodies opposed to their action.

These are very important matters, being the foundations of many mechanical arts, and furnishing us with some of our most convenient and efficacious powers for impelling machines. They are also of very difficult discussion, and are by no means completely investigated or established. Much remains yet to be done both for perfecting the theories and for improving the arts which depend on them.

It is evident, that on these doctrines depend the knowledge of the motions of rivers and of waves; the buoyancy, equilibrium, and stability of ships; the motion of ships through the waters; the action of the winds on the sails; and the whole arts of marine construction and seamanship.

There is another general form of tangible matter which exhibits very different phenomena, which are also extremely interesting; we mean that of VAPOUR. A vapour is a fluid; and all the vapours that we know are heavy fluids: they are therefore subject to all the laws of pressure and impulse, which have been considered under the articles HYDROSTATICS and HYDRAULICS. But they are susceptible of great compression by the action of external forces, and expand again when these forces are removed. In consequence of this compression and expansion, the general phenomena of fluidity receive great and important modifications; and this class of fluids requires a particular consideration. As air is a familiar instance, this branch of mechanical philosophy has been called PNEUMATICS.

Under this head we consider the pressure of the atmosphere, and its effects, both on solid and fluid bodies. It produces the rise of waters or other fluids in pumps and syphons, and gives us the theory of their construction: it explains many curious phenomena of nature, such as the motions in the atmosphere, and their connection with the pressure of the air, and its effect on the barometer or weather glass. Air, when in motion, is called *wind*; and it may be employed to impel bodies. The theory of its action, and of its resistance to moving bodies, are therefore to be considered in this place.

But besides their motions of progression, &c. such as we observe in winds, compressible or elastic fluids are susceptible of what may be termed *internal motion*; a kind of undulation, where the contiguous parts are thrown into tremulous vibrations, in which they are alternately condensed and rarefied; and these undulations are propagated along the mass of elastic fluid, much in the same way in which we observe waves to spread on the surface of water. What makes this an interesting subject of consideration is, that these undulations are the more ordinary causes of sound. A trembling chord, or spring, or bell, agitates the air adjoining to it: these agitations are propagated along the air, and by its intervention agitate the organ of hearing. The mechanism of these undulations has been much studied, and furnishes a very beautiful theory of musical harmony.

The philosopher examines the *law of compressibility* of air and other elastic fluids; and thus gets the knowledge of the constitution of the atmosphere, and of the action of those fluids when employed to impel solid bodies. Gunpowder contains an immense quantity of permanently elastic air, which may be set at liberty by inflammation. When this is done at the bottom of a piece of ordnance, it will impel a ball along the barrel, and

and discharge it from the muzzle, in the same way that an arrow is impelled by a bow. And thus having discovered in what degree this air presses in proportion to its expansion, we discover its action on the ball through the whole length of the piece, and the velocity which it will finally communicate to it. Here then is contained a theory of artillery and of mines.

Chemistry teaches us, that most bodies can be converted by fire into elastic fluids, which can be employed to act on other bodies in the way of pressure or impulse. Thus they come under the review of the mechanical philosopher; and they have become interesting by being employed as moving forces in some very powerful machines.

These discussions will nearly exhaust all the general mechanical phenomena. There remain some which are much more limited, but furnish very curious and important subjects of investigation.

The phenomena exhibited between loadstones or magnets and iron have long attracted attention; and the use to which the polarity of the loadstone has been applied, namely, the directing the course of a ship through the pathless ocean, has rendered these phenomena extremely interesting. They are specified by the term **MAGNETISM**. Considerable progress has been made in the arrangement and generalization of them; but we have by no means been able hitherto to bring them all under one simple fact. The attention has been too much turned to the discovery of the ultimate cause of magnetism; whereas we should have rather employed our ingenuity in discovering all the general laws, in the same manner as Kepler and Newton did with respect to the celestial phenomena, without troubling themselves with the cause of gravitation. Dr Gilbert of Colchester was the first who considered the magnetical phenomena in the truly philosophical manner; and his treatise *De Magnete* may be considered as the first and one of the most perfect specimens of the Baconian or inductive logic. It is indeed an excellent performance; and when we consider its date, 1580, it is a wonder. *Æpinus's Tentamen Theoriæ Magnetismi* is a most valuable work, and contains all the knowledge which we have as yet of the subject.

There is another class of mechanical phenomena which have a considerable affinity with the magnetical; we mean the phenomena called **ELECTRICAL**. Certain bodies, when rubbed or otherwise treated, attract and repel other bodies, and occasion a great variety of sensible motions in the neighbouring bodies. Philosophers have paid much attention to these appearances of late years, and established many general laws concerning them. But we have not been more successful in bringing them all under one fact, and thus establishing a complete theory of them, than in the case of magnetism. Franklin and *Æpinus* are the authors who have been most successful in this respect. Dr Franklin in particular has acquired great celebrity by his most sagacious comparison of the phenomena; which has enabled him to establish a few general laws, almost as precise as those of Kepler, and of equally extensive influence. His discovery too of the identity of thunder and electricity has given an importance and dignity to the whole subject.

There are many phenomena of electricity which cannot be called mechanical, and are of the most cu-

rious and interesting kind. As these have little connection with any of the other great branches of physical science, they have generally been considered in treatises of natural philosophy; and along with inquiries into the original cause of electricity in general, continue to engage much of our attention.

The appearances which are presented to us by our sense of seeing form another class, which have always been considered as making a branch of natural philosophy in all seminaries of learning. It does not, however, obviously appear, that they are mechanical phenomena. The intimate nature of light is still a secret. Fortunately it is not necessary to be known to give us a very perfect theory of the chief phenomena. The general laws of optics are so few, so simple, and so precise, that our theories are perhaps more perfect here than in any other branch of physics; but these theories are as yet far removed from the rank of primary facts. Many unknown events happen before the phenomenon comes under the hands of the ordinary optician, so as to become the subjects of the simple laws of reflection and refraction. It may even be doubted, and has been doubted, whether the phenomena of optics are cases of body in motion; whether all the lines which the optician draws are any thing but the directions along which certain *qualities* are exerted. The side of a ball which is next the candle may be bright and the other side dark, just as the side of a ball which is next the electrical globe is *minus* and the other side *plus*; and all this without any intervening medium. Apparition or visibility may be a quality of a body, depending on the proximity and position of another body, without any thing between them, just as weight is; and this quality may be cognizable by our faculty of seeing alone, just as the pressure of a heavy body is by our feeling alone.

The first thing which made it probable that mechanical philosophy had any thing to do with the phenomena of optics, was the discovery of Mr Roemer, "that apparition was not instantaneous;" that some time elapsed between the illumination of a body and its being seen at a distance. He discovered, that it was not till 40 minutes after the sun illuminated one of Jupiter's satellites that it was seen by an inhabitant of this globe. If therefore a sun were just created, it would be 40 minutes before Jupiter would be illuminated by him, and 200 before the Georgian planet would be illuminated. Here then is motion. It is therefore highly probable that there is something moved; but it is still doubted whether this something, which we call **LIGHT**, is a matter emitted from the shining body, and moving with great velocity, and acting on and affected by other bodies, in the various phenomena of optics. or whether it is a *certain state* of a medium which is thus propagated, as we see that waves are propagated along the surface of water, or sonorous undulations through the mass of air, while the water or air itself is hardly moved out of its place. Either of these suppositions makes optics a legitimate branch of mechanical philosophy; and it is the philosopher's business to examine both by the received laws of motion, and see which of them gives consequences which tally with the phenomena. This has been done, and we imagine that a complete incompatibility has been demonstrated between the consequences of the me-

Mechanical Philosophy. **78** But this does not affect the science of optics. **79** The probable increase of the above extensive field of observation. **80** Investigation of the law that action is always equal and opposite to reaction. **81** The term *inertia* has occasioned much wrangling and misconception on this subject.

dulations of an elastic medium, and the phenomena of optics; while the consequences of the other or vulgar notion on this subject are perfectly consistent with mechanical laws. There are some things in this hypothesis very far beyond our power to conceive distinctly; but they are all similar in this respect to many facts acknowledged by all; and there is no phenomenon that is inconsistent with the legitimate consequences of the hypothesis. This gives it great probability; and this probability is confirmed by many chemical facts, and by facts in the vegetable œconomy, which give strong and almost undeniable indications of light being a body capable of a chemical union with the other ingredients of sublunary bodies, and of being afterwards set at liberty under its own form, as the cause or medium of vision.

But these are questions similar to those about the cause of gravity, and totally unnecessary for establishing a complete theory of the optical phenomena, for explaining the nature of vision, the effects of optical instruments, the cause of colours, the phenomena of the rainbow, halos and periheliums, &c. &c. &c. Only all this theory is unconnected with the principles called mechanical.

Such is the field of observation to the mechanical philosopher of the present day. We may hope to extend it, and by degrees apply its doctrines even to the unseen motions which take place in chemistry and physiology. But we must, in the first place, perfect our knowledge and description of the sensible motions and actions of bodies. Those of fluids still demand much investigation; and till these are thoroughly understood, it is not time to attempt penetrating further into the recesses of nature.

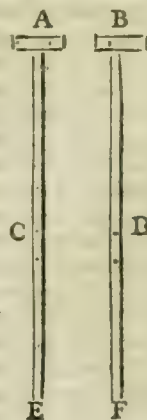
In the prosecution of this study, it is found that every change which can be observed in the state of a body, with respect to motion by the action of another body, is accompanied by an equal and opposite change in the state of that other body. Thus, in the phenomena of gravitation, it is observed that the deflections of the sun and planets are mutual. The same thing is observed in the actions of magnets on each other and on iron; it is also observed in the attractions and repulsions of electrical bodies; and it also obtains in all the phenomena of impulse and of corporeal pressure. It is therefore an universal law of motion, that *action is always equal and opposite to reaction*: but this must be considered merely as a matter of fact, a contingent law of nature, like that of gravitation. The contrary is perfectly conceivable, and involves no contradiction. That this is so, is evident from the proceedings of philosophers, who in every new case make it their business to discover by experiment whether this law was observed or not. It was among the last discoveries made by Sir Isaac Newton in his examination of the celestial motions. This being the case, it should never be assumed as a principle of reasoning till its operation has been ascertained by observation. It has been owing to this improper procedure that much false reasoning has been introduced into mechanical philosophy, and particularly into the theory of impulse or the communication of motion by impulse. In considering this subject, a term has been introduced which has occasioned much wrangling and misconception; we mean the term *INERTIA*. It serves indeed to abbreviate language, but it has often misled the judge-

ment. When used with cautious attention to every circumstance, it expresses nothing but the necessity of a cause to the production of any effect: but it is generally used as expressing a quality inherent in matter, by which it *resists* any change of state, or by which it maintains its present state. Matter is said to be inert; and as every thing which changes the motion of a body is called a *force*, and as this inertia of A is supposed to change the motion of B, it is called *vis inertia*; and yet matter is said to be indifferent as to motion or rest, and to be inactive. These are surely very incongruous expressions. This obscure discourse has arisen from the poverty of all languages, which are deficient in original terms, and therefore employ figurative ones. Force, action, resistance, are all appropriated terms related to our own exertions; and some resemblance between the external effects of these exertions and the effects of the connecting qualities of natural bodies, has made us use them in our disquisitions on these subjects. And as we are conscious that, in order to prevent our being pushed by another from our place, we must resist, exerting force; and that our resistance is the reason why this other man has not accomplished his purpose, we say, that the quiescent body resists being put in motion, and that its inertia is discovered by the diminution made in the motion of the impelling body: and upon the authority of this *vis inertia* as a first principle, the phenomena of impulse are explained, and the law of equal action and reaction is established.

But all this procedure is in contradiction to the rules of inductive logic; and the obscurity and confusion which has arisen from this original misconception, the consequent incongruity of language, and the awkward attempts that have been made to botch and accommodate it to the real state of things, have occasioned a dispute, and the only dispute, in natural philosophy which has not yet been settled, and never can be settled, while such misconceptions are allowed to remain.

If the word *inertia* be taken as expressing, not a quality of matter, but a law of human judgment respecting matter, as expressing our necessity of inferring the agency of a moving force whenever we observe a change of motion, all difficulties will vanish, and the equality of action and reaction will be inferred, as it should be, from the phenomena of collision. There will be inferred a *vis insita corpori impellenti*, not *quâ moventi*, but *quâ corpori*; and this inference will carry us through all the mysteries of corporeal action, as it conducted Sir Isaac Newton in his grand researches.

Let us just consider how we reason in a new case. Let A and B be two magnets fastened on the ends of two long wooden laths AE, BE, which turn horizontally on pivots C, D, like compass needles, with their north poles fronting each other, 12 inches apart; and let A be pushed towards B, so that it would move uniformly with the velocity of two inches in a second. The phenomena which have been observed are as follow: A will gradually diminish its velocity; and when it has advanced about nine inches, will stop completely. B, in the mean time, will gradually acquire motion; and



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when it has advanced about nine inches, will have a velocity of about two inches per second, with which it will continue to move uniformly. Now what is inferred from these phenomena? Because the motion of A is gradually retarded, we infer that a retarding force, that is, a force in the direction BA has acted on it. And since this would not have happened if B had not been there, and always happens when B is there, we infer that B is either its cause or the occasion of its action. The vulgar say that B repels A; so say the dynamists. The abettors of invisible fluids say, that a stream of fluid issuing from B impels A in the opposite direction. All naturalists agree in saying, that an active force connected with B has destroyed the motion of A, and consider this curious phenomenon as the indication and characteristic of a discovery. The same inference is made from the motion produced in B: it is considered by all as effected by a force exerted or occasioned by the presence of A; and the dynamists and the vulgar say that A repels B. And both parties conclude, from the equal changes made on both bodies, that the changing forces are equal: here acknowledging, that they observe an equality of action and reaction; and they add this to the other instances of the extent of this law of motion.

therefore no such quality is possible. It is no less so to say, that matter has no active property but that of moving other matter by impulse; and that because it may be so moved, and also by the agency of our own minds, therefore, when it is not moved by impulse, it is moved by minds. The same almighty FIAT which brought a particle of matter into existence could bring those qualities equally into existence; and the *how* in both is equally beyond our comprehension.

But, on the other hand, we must guard against the incurious resting on this consideration as a stop to further inquiry. There may be species of matter possessed of the mechanical powers, and which notwithstanding is not cognisable by our senses. All the properties of matter are not known to a person who is both deaf and blind; and beings possessed of more senses may perceive matter where we do not; and many phenomena may really be produced by the action of intervening matter, which we, from indolence or from haste, ascribe to the agency of inherent forces. The industry of philosophers has already discovered intermedia in some cases. It is now certain that air is the conveyer of sound, and it is almost certain that there is such a thing as light. Let us therefore indulge conjectures of this kind, and examine the conjectures by the received laws of motion, and reject them when we find the smallest inconsistency; and always keep in mind that even the most coincident with the phenomena is still but a possibility.

We may conclude the whole of these observations with the remark, that these questions about the activity or inactivity of matter are not physical, but metaphysical. Natural philosophy, it is true, commonly takes it for granted that matter is wholly inactive; but it is not of any moment in physics whether this opinion is true or false; whether matter is acted on according to certain laws, or whether it acts of itself according to the same laws, makes no difference to the natural philosopher. It is his business to discover the laws which really obtain, and to apply these to the solution of subordinate phenomena: but whether these laws arise from the nature of some agent external to matter, or whether matter itself is the agent, are questions which may be above his comprehension, and do not immediately concern his proper business.

The account we have now given of natural philosophy points out to us in the plainest manner the way in which the study must be prosecuted, and the helps which must be taken from other branches of human knowledge.

The causes, powers, forces, or by whatever name we choose to express them, which produce the mechanical phenomena of the universe, are not observed, and are known to us only in the phenomena themselves. Our knowledge of the mechanical powers of nature must therefore keep pace with our knowledge of the motions, and indeed is nothing different from it. In order to discover and determine the forces by which the moon is retained in her orbit round the earth, we must know her motions. To a terrestrial spectator she appears to describe an ellipse, having the earth in one focus; but, in the mean time, the earth is carried round the sun, and the moon's real path, in absolute space, is a much more complicated figure. Till we know this figure, and the variations in the velocity with

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If other phenomena give unquestionable evidence that, in ordinary collisions, there is the same changes of motion, produced without mathematical contact, the same inferences must be drawn; and a scrupulous naturalist will doubt whether contact should make any change in our reasonings on the subject, and whether actual contact ever has been or can be observed. He will also be convinced, that while this is the general, or perhaps universal, process of nature in producing motion by impulse, all explanations of the action of bodies *e distant*, by the intervention of ethers and other invisible fluids, are nothing but multiplying the difficulties; for in place of one fact, the approach of one magnet (for instance) to another, they substitute millions of unseen impulses, each of which equally needs an explanation. And if this fluid be supposed to produce its effects by any peculiarity in its constitution, as in the case of Newton's elastic ether proposed by him to explain gravitation, the hypothesis substitutes, in the most unqualified manner, millions of similar phenomena for the one to be explained; for there is the same want of a second fluid in order to produce that mutual recess of the particles of the ether which constitutes its elasticity.

And this seems to be the limit to our inquiries into all the classes of natural phenomena. We find the masses or the particles of matter endued in fact with qualities which affect the state of other particles or masses, at smaller or at greater distances from each other according to certain general rules or laws. This ultimate step in the constitution of things is inscrutable by us. It is arrogance in the highest degree for us to say, that because we do not comprehend how there is inherent in a body any quality by which another body may be affected at any distance from it,

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Mechanical Philosophy with which it is described, we know nothing of the forces which actuate the moon in her orbit.

When Newton says that the forces by which she is retained in this elliptical orbit are directed to the earth, what does he mean? Only this, that the deflection from that uniform rectilinear motion which she would otherwise have performed are always in this direction. In like manner, when he says that these forces are inversely proportionate to the squares of her distances from the earth, he only means that the deflections made in equal times in different parts of her motion are in this proportion. These deflections are considered as the characteristics and measures of the forces. We imagine that we have made all plain when we call this indicated cause a *tendency* to the earth; but we have no notion of this tendency to the earth different from the approach itself. This word tendency, so fashionable among the followers of Sir Isaac Newton, is perverted from its pure and original sense. *Tendere versus solem*, is, in the language of Rome, and also of Newton, to go towards the sun; but we now use the words *tend*, *tendency*, to signify, not the *approach*, but the *cause* of this approach. And when called upon to speak still plainer, we desert the safe paths of plain language, and we express ourselves by metaphor; speaking of *nifus*, *conatus sese mutuo accedende*, *vis centripeta*, &c. When these expressions have become familiar, the original sense of the word is forgotten, and we take it for granted that the words never had another meaning; and this metaphor, sprung from the poverty of language, becomes a fruitful source of misconception and mistake. The only way to secure ourselves against such mystical notions as are introduced by these means into philosophy, is to have recourse to the way in which we acquire the knowledge of these fancied powers; and then we see that their names are only names for phenomena, and that universal gravitation is only a universal mutual approach among the parts of the solar system.

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The absurdity of reasoning *a priori*.

There is one case in which we fondly imagine that we know the cause independent of the effect, and that we could have predicted the phenomenon *a priori*: we mean the case of impulse: and hence it is that we are so prone to reduce every thing to cases of impulsion, and that we have fallen upon all these subtleties of ethers and other subtle fluids. But we might have saved ourselves all this trouble; for after having, by much false reasoning and gratuitous assumptions, shown that the phenomenon in question *might have been produced* by impulse, we are no nearer our purpose, because that property by which matter in motion puts other matter in motion, is known to us only *by* and *in* the effect.

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We know nothing of the immediate cause of motions except by a knowledge of the motions themselves.

The fair and logical deduction from all this is, that we must not expect any knowledge of the powers of nature, the immediate causes of the motions of bodies, but by means of a knowledge of the motions themselves; and that every mistake in the motions is accompanied by a similar mistake in the causes. It is impossible to demonstrate or explain the gravitation of the planets to him who is ignorant of the properties of the ellipse, or the theory of gunnery to him who does not know the parabola.

A notion has of late gained ground, that a man may become a natural philosopher without mathema-

tical knowledge; but this is entertained by none who have any mathematics themselves; and surely those who are ignorant of mathematics should not be sustained as judges in this matter. We need only appeal to fact. It is only in those parts of natural philosophy which have been mathematically treated, that the investigations have been carried on with certainty, success, and utility. Without this guide, we must expect nothing but a school-boy's knowledge, resembling that of the man who takes up his religious creed on the authority of his priest, and can neither give a reason for what he imagines that he believes, nor apply it with confidence to any valuable purpose in life. We may read and be amused with the trifling or vague writings of a Nollet, a Ferguson, or a Priestley; but we shall not understand, nor profit by the truths communicated by a Newton, a D'Alembert, or De la Grange.

These observations, on the other hand, show us the nature of the knowledge which may be acquired, and the rank which natural philosophy holds among the sciences.

Motions are the real and only objects of our observation, the only subjects of our discussion. In motion is included no ideas but those of space and time, the subjects of pure mathematical disquisition. As soon, therefore, as we have discovered the fact, the motion, all our future reasonings about this motion are purely mathematical, depending only on the affections of figure, number, and proportion, and must carry along with them that demonstration and irresistible evidence which is the boast of that science. To this are we indebted for that accuracy which is attained, and the progress which has been made in some branches of mechanical philosophy; for when the motions are distinctly and minutely understood, and then considered only as mathematical quantities, independent of all physical considerations, and we proceed according to the just rules of mathematical reasoning, we need not fear any intricacy of combination or multiplicity of steps; we are certain that truth will accompany us, even though we do not always attend to it, and will emerge in our final proposition, in the same manner as we see happen in a long and intricate algebraic analysis.

Mechanical philosophy, therefore, which is cultivated in this way, is not a system of probable opinions, but a *disciplina accurata*, a demonstrative science. To possess it, however, in this form, requires considerable preparation. The mere elements of geometry and algebra are by no means sufficient. Newton could not have proceeded *sine* "*sua mathese facem preferente*;" and, in creating a new science of physics, he was obliged to search for and discover a new source of mathematical knowledge. It is to be lamented that the taste for the mathematical sciences has so prodigiously declined in this country of late years; and that Britain, which formerly took the lead in natural philosophy, should now be the country where they are least cultivated. Few among us know more than a few elementary doctrines of equilibrium; while, on the continent, we find many authors who cultivate the Newtonian philosophy with great assiduity and success, and whose writings are consulted as the fountains of knowledge by all our countrymen who have occasion to employ the discoveries in natural philosophy in the arts of life. It is

to the foreign writers that we have recourse in our seminaries, even for elementary treatises; and while the continent has supplied us with most elaborate and useful treatises on various articles in physical astronomy, practical mechanics, hydraulics, and optics, there has not appeared in Britain half a dozen treatises worth consulting for these last forty years; and this notwithstanding the unparalleled munificence of our present sovereign, who has given more liberal patronage to the cultivators of mathematical philosophy, and indeed of science in general, than any prince in Europe. The magnificent establishments of Louis XIV. originated from his insatiable ambition and desire of universal influence, directed by the sagacious Colbert. And his patronage being exerted according to a regular plan in the establishment of pensioned academics, and in procuring the combined efforts of the most eminent of all countries, his exertions made a conspicuous figure, and filled all Europe with his eulogists. But all this was done without the smallest self-denial, or retrenchment of his own pleasures, the expences being furnished out of the public revenues of a great and oppressed nation; whereas the voyages of discovery, the expensive observations and geodetical operations in Britain, and the numberless unheard-of pensions and encouragements given to men of science and activity, were all furnished out of the private estate of our excellent sovereign, who seems to delight in repaying, by every service in his power, the attachment of a loyal and happy nation. It is therefore devoutly to be wished that his patriotic efforts were properly seconded by those whom they are intended to serve, and that the taste for the mathematical sciences may again turn the eyes of Europe to this country for instruction and improvement. The present seems a most favourable era, while the amazing advances in manufactures of every kind seem to call aloud for the assistance of the philosopher. What pleasure would it have given to Newton or Halley to have seconded the ingenious efforts of a Watt, a Boulton, a Smeaton, an Arkwright, a Dollond? and how mortifying is it to see them indebted to the services of a Belidor, a Bossut, a Clairaut, a Boscovich?

We hope to be pardoned for this digression, and return to our subject.

It appears from what has been said, that mechanical philosophy is almost wholly a mathematical study, and that it is to be successfully prosecuted only under this form: but in our endeavours to initiate the young beginner, it will be often found to require more steadiness of thought than can generally be expected for keeping the mind engaged in such abstract speculations. The object presented to the mind is not readily apprehended with that vivacity which is necessary for enabling us to reason upon it with clearness and steadiness, and it would be very desirable to have some means of rendering the conception more easy, and the attention more lively. This may be done by exhibiting to the eye an experiment, which, though but a single fact, gives us a sensible object of perception, which we can contemplate and remember with much more steadiness than any mere creature of the imagination. We could, by an accurate description, give such a conception of a room that the hearer should perfectly comprehend our narration of any occurrence in it: but one moment's glance at the room would be

infinitely better. It is usual therefore to employ experiments to assist the imagination of the beginner; and most courses of natural philosophy are accompanied by a series of such experiments. Such experiments, connected by a slight train of argumentative discourse, may even serve to give a notion of the general doctrines, sufficient for an elegant amusement, and even tending to excite curiosity and engage in a serious prosecution of the study. Such are the usual courses which go by the name of experimental philosophy: but this is a great misapplication of the term; such courses are little more than *illustrations* of known doctrines by experiments.

EXPERIMENTAL PHILOSOPHY is the investigation of general laws, as yet unknown, by experiment; and it has been observed, under the article PHILOSOPHY, that this is the most infallible (and indeed the sole) way of arriving at the knowledge of them. This is the *Novum Organum Scientiarum* strongly recommended by Lord Bacon. It was new in his time, though not altogether without example; for it is the procedure of nature, and is followed whenever curiosity is excited. There was even extant in his time a very beautiful example of this method, viz. the *Treatise of the Loadstone*, by Dr Gilbert of Colchester; a work which has hardly been excelled by any, and which, when we consider its date, about the year 1580, is really a wonderful performance.

The most perfect model of this method is the *Optics* of Sir Isaac Newton. Dr Black's *Lectures on Magnetism* is another very perfect example. Dr Franklin's *Theory of Electricity* is another example of great merit. That the investigation is not complete, nor the conclusions certain, is not an objection. The method is without fault; and a proper direction is given to the mind for the experiments which are still necessary for establishing the general laws.

It were much to be wished that some person of A good talents and of extensive knowledge would give a treatise on the method of inquiry by experiment. Although many beautiful and successful examples have been given, many particular branches of inquiry, we have but too many instances of very inaccurate and inconclusive investigations. Experiments made at random, almost without a view, serve but little to advance our knowledge. They are like shapeless lumps of stone, merely detached from the rock, but still wanting the skill of the builder to select them for the different purposes which they may chance to serve; while well contrived experiments are blocks cut out by a skillful workman, according as the quarry could furnish them, and of forms suited to certain determined uses in the future edifice. Every little series of experiments by Margraf terminates in a general law, while hardly any general conclusion can be drawn from the numberless experiments of Pott. Lord Bacon has written much on this subject, and with great judgment and acuteness of distinction; but he has exceeded in this, and has fatigued his readers by his numerous rules; and there is in all his philosophical works, and particularly in this, a quaintness and affectation that greatly obscure his meaning, so that this most valuable part of his writings is very little read.

A formidable objection has been made to this method of inquiry. Since a physical law is only the expression of a

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amples
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expression of a general fact, and is established only in consequence of our having observed a similarity in a great number of particular facts; and since the great rule of inductive logic is to give the law no greater extent than the induction on which it is founded—how comes it that a few experiments must be received as the foundation of a general inference? This has been answered in very general terms in the article PHILOSOPHY. But it will be of use to consider the subject a little more particularly. Our observations on this subject are taken from in the dissertation on evidence by Dr Campbell in his *Philosophy of Rhetoric*.

An attentive consideration of the objects around us, will inform us that they are generally of a complicated nature, not only as consisting of a complication of those qualities of things called accidents, such as gravity, mobility, colour, figure, solidity, which are common to all bodies; but also as consisting of a mixture of a variety of substances, very different in their nature and properties; and each of these is perhaps compounded of ingredients more simple.

Moreover, the farther we advance in the knowledge of nature, we find the more reason to be convinced of her constancy in all her operations. Like causes have always produced like effects, and like effects have always been preceded by like causes. Inconstancy sometimes appears in Nature's works at *first sight*; but a more refined experience shows us that this is but an appearance, and that there is no inconstancy: and we explain it to our satisfaction in this way.

Most of the objects being of a complicated nature, we find, on an accurate scrutiny, that the effects ascribed to them ought often to be solely ascribed to one or more of these component parts, while the others either do not contribute to them, or hinder their production; and the variety of nature is so great, that hardly any two individuals of the same species are in every respect like any other. On all these accounts we expect dissimilarities in the phenomena accompanying perfectly similar treatment of different subjects of the same kind; but we find, that whenever we can be assured that the two substances are perfectly alike, the phenomena arising from similar treatment are the same: and long and extensive observation teaches us, that there are certain circumstances which insure us in the perfect similarity of constitution of some things. Whenever we observe the effect of any natural agent on one, and but one, of these, we invariably expect that the same will be produced on any other.

Should a botanist meet with a plant new to him, and observe that it has seven monopetalous flowers, he will conclude with the utmost confidence that every plant of this species will have monopetalous flowers; but he will not suppose that it will have seven, and no more than seven, flowers. Now these two facts seem to have no difference to warrant such a difference in the conclusion; which may therefore seem capricious, since there is but one example of both.

But it is not from this example only that he draws the conclusion. Had he never before taken notice of any plant, he would not have reasoned at all from these remarks. But his mind runs immediately from this unknown species to all the known species of this genus, and to all the genera of the same order; and having experienced in the *figure* of the flower an

uniformity in every species, genus, and order, which admits of no exception, but, in the *number* of flowers, a variety as boundless as are the circumstances of soil, climate, age, and culture, he learns to mark the difference, and draws the above-mentioned conclusions. Thus we learn, that *perfect* uniformity is not to be expected in any instance whatever, because in no instance is the simplicity of constitution sufficiently great to give us assurance of perfect uniformity in the circumstances of the case; and the utmost that our experience can teach us is a quick discrimination of those circumstances which produce the occasional varieties.

The nearer that our investigations carry us to the knowledge of *elementary* natures, the more are we convinced by general experience of the uniformity of the operations of real elements; and although it may perhaps be impossible for us ever to arrive at the knowledge of the simplest elements of any body, yet when any thing *appears* simple, or rather so exactly uniform, as that we have invariably observed it to produce similar effects on discovering any *new* effect of this substance, we conclude, from a general experience of the efficient, a like constancy in the energy as to the rest. Fire consumes wood, melts lead, and hardens clay. In these instances it acts uniformly, but not in these only. We have always found, that whatever of any species is consumed by it in one instance, has been consumed by it on trial at any time. If therefore a trial be made for the first time of its influence on any particular substance, he who makes it is warranted to conclude that the effect, whatever it may be, is a faithful representative of its effects on this substance in all past and future ages. This conclusion is not founded on this single instance, but upon this instance combined with the general experience of the regularity of this element in its operations.

This general conclusion, therefore, drawn from one experiment, is by no means in opposition to the great rule of inductive logic, but, on the contrary, it is the most general and refined application of it. General laws are here the real subject of consideration; and a law still more general, viz. *that nature is constant in all its operations*, is the inference which is here applied as a principle of explanation of a phenomenon which is itself a general law, viz. *that nature is constant in this operation*.

The foundation of this general inference from one experiment being so firmly established, it is evident that experiments must be an infallible method of attaining to the knowledge of nature; and we need only be solicitous that we proceed in a way agreeable to the great rule of inductive logic; that is, the subject must be cleared of every accidental and *unknown* circumstance, and put into a situation that will reduce the interesting circumstance to a state of the greatest possible simplicity. Thus we may be certain that the event will be a faithful representative of every similar case; and unless this be done in the preparation, nothing can result from the most numerous experiments but uncertainty and mistakes.

The account which has been given of mechanical philosophy would seem to indicate that experiment was not of much use in the farther prosecution of it. The two laws of motion, with the assistance of mathematics, seem fully adequate to the explanation of every phenomenon;

phenomenon; and so they are to a certain degree. But this degree is as yet very limited. Our mathematical knowledge, great as it is in comparison with that of former times, is still insufficient for giving accurate solutions even of very simple (comparatively speaking) questions. We can tell, with the utmost precision, what will be the motions of two particles of matter, or two bodies, which act on each other with forces proportioned to the squares of the distances inversely; but if we add a third particle, or a third body, acting by the same law, the united science of all Europe can only give an approximation to the solution.

What is to be done then in the cases which come continually before us, where millions of particles are acting at once on each other in every variety of situation and distance? How shall we determine, for instance, the motion of water through a pipe or sluice when urged by a piston or by its own weight? what will be its velocity and direction? It is impossible, in the present state of mathematical knowledge, to tell with any precision or certainty. And here we must have recourse to experiment. But if this be the case, must the experiment be made in every possible variety of situation, depth, figure, pressure? or is it possible to find out any general rules, founded on the general laws of motion, and rationally deduced from them? Or, if this cannot be accomplished, will experiment itself furnish any general coincidences which show such mutual dependences, that we may consider them as indications of general principles, though subordinate, complicated, and perhaps inscrutable? This can be discovered by experiment alone.

The attention of philosophers has been directed to each of these three chances, and considerable progress has been made in them all. Numerous experiments have been made, almost sufficient to direct the practice in many important cases, without the help of any rule or principle whatever. But there are many cases, and these of by far the greatest importance, such as the motion of a ship impelled by the winds, resisted by the water, and tossed by the waves, where distinct experiments cannot be made.

Newton, Bernoulli, D'Alembert, and others, have laboured hard to deduce from the laws of motion rules for determining what may be called the *average* motion of water in these circumstances, without attempting to define the path or motion of any individual particle; and they have actually deduced many rules which have a great degree of probability. It may here be asked, why do you say *probability*? the rules, as far as they go, should be *certain*. So they are: they are strict deductions from their premises. But the premises are only *suppositions*, of various degrees of probability, assumed in order to simplify the circumstances of the case, and to give room for mathematical reasoning; therefore these deductions, these rules, must be examined by experiment. Some of the suppositions are such as can hardly be refused, and the rules deduced from them are found to tally precisely with the phenomena. Such is this, "that the velocities of issuing water in similar circumstances are in the subduplicate ratio of the pressures." And this rule gives a most important and extensive information to the engineer. Other suppositions are more gratuitous, and the rules deduced from them are less coincident with

the phenomena. The patient and sagacious Newton has repeatedly failed in his attempts to determine what is the *absolute velocity* of water issuing from a hole in the bottom of a vessel when urged by its weight alone, and the attempts of the others have hardly succeeded better. Experiment is therefore absolutely necessary on this head.

Those who have aimed at the discovery of *rules* purely experimental on this subject, have also been pretty successful; and the Chevalier Borda has, from a comparison of an immense variety of experiments made by himself and various authors, deduced an empirical rule, which will not be found to deviate from truth above one part in ten in any case which has yet come to our knowledge.

This instance may serve to show the use of experiments in mechanical philosophy. It is proper in all cases by way of illustration; and it is absolutely necessary in most, either as the foundation of a characteristic of a particular class of phenomena, or as argument in support of a particular doctrine. Hydrostatics, hydraulics, pneumatics, magnetism, electricity, and optics, can hardly be studied in any other way; and they are at present in an imperfect state, and receiving continual improvement by the labours of experimental philosophers in all quarters of the world.

Having in the preceding paragraphs given a pretty full enumeration of the different subjects which are to be considered in the study of natural philosophy, it will not be necessary to spend much time in a detail of the advantages which may reasonably be expected from a successful prosecution of this study. It stands in no need of panegyric: its intimate connection with the arts gives it a sufficient recommendation to the attention of every person. It is the foundation of many arts, and it gives liberal assistance to all. Indebted to them for its origin and birth, it has ever retained its filial attachment, and repaid all their favours with the most partial affection.

To this science the navigator must have recourse for that astronomical knowledge which enables him to find his place in the trackless ocean: and although very small scraps of this knowledge are sufficient for the mere pilot, it is necessary that the study be prosecuted to the utmost by some persons, that the unlearned pilot may get that scanty pittance which must direct his routine. The few pages of tables of the sun's declination, which he uses every day to find his latitude, required the successive and united labours of all the astronomers of Europe to make them tolerably exact; and in order to ascertain his longitude with precision, it required all the genius of a Newton to detect the lunar irregularities, and bring them within the power of the calculator; and, till this was done, the respective position of the different parts of the earth could not be ascertained. Vain would have been the attempt to do this by geodetical surveys independent of astronomical observation. It is only from the most refined mechanics that we can hope for sure principles to direct us in the construction and management of a ship, the boat of human art, and the great means of union and communication between the different quarters of the globe.

A knowledge of mechanics not much inferior to an architect's is necessary for enabling the architect to execute

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some of his greatest works, such as the erection of domes and arches, which depend on the nicest adjustment of equilibrium. Without this he cannot unite economy with strength; and his works must either be clumsy masses or flimsy shells.

The effects of artillery cannot be understood or secured without the same knowledge.

The whole employment of the engineer, civil or military, is a continued application of almost every branch of mechanical knowledge; and while the promises of a Smeaton, a Watt, a Belidor, may be confided in as if already performed, the numberless failures and disappointments in the most important and costly projects show us daily the ignorance of the pretending crowd of engineers.

The microscope, the steam-engine, the thunder-rod, are presents which the world has received from the natural philosopher; and although the compass and telescope were the productions of chance, they would have been of little service had they not been studied and improved by Gilbert, Halley, and Dollond.

But it is not in the arts alone that the influence of natural philosophy is perceptible: it lends its aid to every science, and in every study.

It is often necessary to have recourse to the philosopher in disputes concerning property; and many examples might be given where great injustice has been the consequence of the ignorance of the judges. Knowledge of nature might have prevented many disgraceful condemnations for felony.

The historian who is ignorant of natural philosophy easily admits the miraculous into his narrations, accompanies these with his reflections, draws consequences from them, and fills his pages with prodigies, fables, and absurdity.

It is almost needless to speak of the advantages which will accrue to the physician from this study. So close is the connection between it and medicine, that our language has given but one name to the naturalist and to the medical philosopher. Indeed, the whole of his study is a close observation of the laws of material nature, in order to draw from them precepts to direct his practice in the noble art of healing. During the immaturity of general knowledge, while natural philosophy was the only study which had acquired any just pretension to certitude either in its principles or method of investigation, the physicians endeavoured to bring the objects of their study within its province, hoping by this means to get a more distinct view of it; and they endeavoured to explain the abstruse phenomena of the animal functions by reducing them all to motions, vibrations, collisions, impulses, hydrostatic and hydrauic pressures and actions, with which the mechanical philosophers were so ardently occupied at that time. But unfortunately their acquaintance with nature was then very limited, and they were but little habituated to the rules of just reasoning; and their attempts to explain the economy of animal life by the laws of mechanics did them but little service either for the knowledge of diseases or of the methods of cure. The mechanical theories of medicine, which had considerable reputation about the end of last century, were many of them very ingenious, and had an imposing appearance of symmetry and connection; but are now forgotten, having all been formed on the narrow sup-

position that matter was subject only to mechanical laws.

But the discovery of error diminishes the chance of again going wrong, especially when the cause of error has been discovered, and the means pointed out of detecting the mistakes; and the vital principle must combine its influence with, or operate on, the properties of rule matter. It appears therefore evident that a knowledge of the mechanical laws of the material world is not only a convenient, but a necessary, a accomplishment to the physician. We are fully justified in this opinion, by observing medical authors of the present day introducing into medicine theories borrowed from mechanical philosophy, which they do not understand, and which they continually misapply. Appearance of reasoning frequently conceals the errors in principle, and seldom fails to mislead.

But there is no class of men to whom this science is of more service than to those who hold the honourable office of the teachers of religion. Their knowledge in their own science, and their public utility, are prodigiously hurt by ignorance of the general frame and constitution of nature; and it is much to be lamented that this science is so generally neglected by them, or considered only as an elegant accomplishment: nay, it is too frequently shunned as a dangerous attainment, as likely to unhinge their own faith, and taint the minds of their hearers. We hope, however, that few are either so feebly rooted in the belief of the great doctrines of religion as to fear this, or of minds so base and corrupted as to adopt and inculcate a belief which they have any suspicion of being ill-founded. But many have a sort of horror at all attempts to account for the events of nature by the intervention of general causes, and think this procedure derogatory to the Divine nature, and inconsistent with the doctrine of His particular providence; believing, that "a sparrow does not fall to the ground without the knowledge of our heavenly Father." Their limited conceptions cannot perceive, that, in forming the general law, the Great Artist did at one glance see it in its remotest and most minute consequence, and adjust the vast assemblage so as completely to answer every purpose of His providence. There never was a more eager inquirer into the laws of nature, or more ardent admirer of its glorious Author, than the Hon. Robert Boyle. This gentleman says, that he will always think more highly of the skill and power of that artist who should construct a machine, which, being once set a going, would of itself continue its motion for ages, and from its inherent principles continue to answer all the purposes for which it was first contrived, than of him whose machine required the continual aid of the hand which first constructed it. It is owing to great inattention that this aversion to the operation of secondary causes has any influence on our mind. What do we mean by the introduction of secondary causes? How do we infer the agency of any cause whatever? Would we ever have supposed any cause of the operations of nature, had they gone on without any order or regularity? Or would such a chaos of events, any more than a chaos of existences, have given us any notion of a forming and directing hand? No surely. We see the hand of God in the regular and unvaried course of nature, only because it is regular and unvaried. The philosopher

phenomena express this by saying, that the phenomena proceed by unalterable laws. Greatly mistaken therefore are they who think that we supersede the existence of mind and of providence when we trace things to their causes. A physical law being an unvaried fact, is an indication, and the strongest possible indication, of an unerring mind, who is incapable of change, and must do to day what He always did: for to change is to deviate from what is best. The operations of an unerring mind will therefore be regular and invariable. Physical laws, therefore, or secondary causes, are the best proofs of unerring wisdom. Such regularity of conduct is universally considered as indications of wisdom among men. The wise man is known by the constancy of his conduct, while no man can depend on the future conduct of a fool.

unto Cæsar the things that are Cæsar's, and to God the things that are God's."

But besides these advantages which accrue to different classes of men from this study, there are some effects which are general, and are too important to be passed over unnoticed.

That spirit of dispassionate experimental inquiry which has so greatly promoted this study, will carry with it, into every subject of inquiry, that precision and that constant appeal to fact and experience which characterise it. And we may venture to assert, that the superior good order and method which distinguish some of the later productions in other sciences, have been in a great measure owing to this mathematical spirit, the success of which in natural philosophy has gained it credit, and thus given it an unperceived influence even over those who have not made it their study.

And what astonishing evidences of wisdom do we not observe in the general laws of the material world? They will ever be considered by the intelligent philosopher as the most glorious display of inconceivable wisdom, which has been able, by means so few and so simple, to produce effects which by their grandeur astonish our feeble understandings, and by their innumerable variety elude all possibility of enumeration.

While the teachers of religion remain ignorant of the beautiful laws of nature, the great characteristics of the wisdom and goodness of the Almighty Creator, their hearers are deprived of much sublime pleasure; God is robbed of that praise which he would have received from an enlightened people; and the only worship he receives is tainted with mean notions of his attributes, and groundless fears of his power.

Let not our minds be haunted with fear of the pernicious effects of philosophy, in consequence of the dreadful explosion which the vanity of man has lately made in France. The ruffians who now rule in that unhappy country, through the support of the licentious mob of Paris, are continually imputing to the illumination of philosophy the ardour which now animates them in the cause of liberty; and they are continually saying, that justice and morality are the order of the day. But their whole phraseology is equally a perversion of every thing in language and in sentiment. The sacred name of philosophy is as unfit for their faithless and bloody mouths as the names of liberty or virtue, and is equally misapplied. No wonder that religion fled from the torch of their philosophy: for their philosophy consists expressly in the confounding the most distinct classes of phenomena and of beings, in assimilating the heavenly animating spark within us to a piece of rude matter, and in degrading man to the level of the brutes, and thus shutting out his fairest prospects. It is not by the ordinary dialectics of the theologian that this sacrilegious confusion can be rectified: this requires an intimate acquaintance with what is characteristic of mind, and what is characteristic of matter, and a comprehensive view of the general laws which regulate the appearances in both classes of objects. Thus, and thus alone, will the divine be able to confute the detestable sophisms of Mirabeau and Diderot and the other *soi-disant* sages of France; and persuade their willing hearers to "render

The truths also which the naturalist discovers are such as do not in general affect the passions of men, and have therefore a good chance of meeting with a candid reception. Those whose interest it is to keep men in political or religious ignorance, cannot easily suspect bad consequences from improvements in this science; and if they did, have hardly any pretext for checking its progress. And discoveries accustom the mind to novelty; and it will no longer be startled by any consequences, however contrary to common opinion. Thus the way is paved for a rational and discreet scepticism, and a free inquiry on other subjects. Experiment, not authority, will be considered as the test of truth; and under the guidance of fair experience we need fear no ill as long as the laws of nature remain as they are.

Lastly, since it is the business of philosophy to describe the phenomena of nature, to discover their causes, to trace the connection and subordination of these causes, and thus obtain a view of the whole constitution of nature; it is plain that it affords the surest path for arriving at the knowledge of the great cause of all, of God himself, and for forming proper conceptions of him and of our relations to him: notions infinitely more just than can ever be entertained by the careless spectator of his works. Things which to this man appear solitary and detached, having no other connection with the rest of the universe but the shadowy and fleeting relation of coexistence, will, to the diligent philosopher, declare themselves to be parts of a great and harmonious whole, connected by the general laws of nature, and tending to one grand and beneficent purpose. Such a contemplation is in the highest degree pleasant and cheering, and cannot fail of impressing us with the wish to co-operate in this glorious plan, by acting worthy of the place we hold among the works of God, and with the hopes of one day enjoying all the satisfaction that can arise from conscious worth and consummate knowledge; and this is the worship which God will approve. "This universe (says Boyle) is the magnificent temple of its great Author; and man is ordained, by his powers and qualifications, the high priest of nature, to celebrate divine service in this temple of the universe."

Physiognomica PHYSGNOMONICS, among physicians, denote such signs as, being taken from the countenance, serve to indicate the state, disposition, &c. both of the

body and mind: and hence the art of reducing these signs to practice is termed *physiognomy*.

PHYSIOGNOMY,

¹ *Various definitions of Physiognomy - its ancient and modern den.* **I**S a word formed from the Greek *opsis* nature, and *gnomon* I know. It is the name of a science which occupied much of the attention of ancient philosophers, and which, since the revival of learning, has in a great degree been disregarded. Till of late it has fallen in modern times been mentioned, except in conjunction with the exploded arts of magic, alchemy, and judicial astrology. Within the two last centuries, no doubt, the bounds of human knowledge have been greatly extended by means of the patient pursuit of fact and experiment, instead of the hasty adoption of conjecture and hypothesis. We have certainly discovered many of the ancient systems to be merely creatures of imagination. Perhaps, however, in some instances, we have decided too rapidly, and rejected real knowledge, which we would have found it tedious and troublesome to acquire. Such has been the fate of the science of physiognomy; which certainly merits to be considered in a light very different from alchemy and those other fanciful studies with which it had accidentally been coupled. The work lately published by M. Lavater on the subject has indeed excited attention, and may perhaps tend to replace physiognomy in that rank in the circle of the sciences to which it seems to be intitled.

It does not appear that the ancients extended the compass of physiognomy beyond man, or at least animated nature: But the study of that art was revived in the middle ages, when, misled probably by the comprehensiveness of the etymological meaning of the word, or incited by the prevalent taste for the marvellous, those who treated of the subject stretched the range of their speculation far beyond the ancient limits. The extension of the signification of the term was adopted universally by those naturalists who admitted the theory of signatures (see SIGNATURE); and physiognomy came thus to mean, the knowledge of the internal properties of any corporeal existence from the external appearances. Joannes Baptista Porta, for instance, who was a physiognomist and philosopher of considerable eminence, wrote a treatise on the physiognomy of plants (*philognomonica*), in which he employs physiognomy as the generic term. There is a treatise likewise *De Physiognomia Avium*, written we believe by the same person. In the *Magia Physiognomica* of Gaspar Schottus, *physiognomia humana* is made a subdivision of the science.

Boyle too adopts the extensive signification mentioned, which indeed seems to have been at one time the usual acceptation of the word (A). At present physiognomy seems to mean no more than "a know-

ledge of the moral character and extent of intellectual powers of human beings, from their external appearance and manners." In the Berlin Transactions for the years 1769 and 1770 there appears a long controversial discussion on the subject of the definition of physiognomy between M. Pernetty and M. Le Cat, two modern authors of some note. Pernetty contends, that *all knowledge whatever* is physiognomy; Le Cat confines the subject to the human face. Neither seems to have hit the medium of truth. Soon after the celebrated book of Lavater appeared. He indeed defines physiognomy to be, "the art of discovering the interior of men by means of his exterior; but in different passages of his work he evidently favours the extended signification of Pernetty. This work gave occasion to M. Formey's attack upon the science itself in the same Berlin Transactions for 1775. Formey strenuously controverts the extent assigned by Lavater to his favourite science.

² Before the era of Pythagoras the Greeks had little or no science, and of course could not be scientific physiognomists. Pythagoras probably brought this science to Greece. Physiognomy, however, was much cultivated in Egypt and India; and from these countries the sage of Samos probably introduced the rudiments of this science, as he did those of many others, generally deemed more important, into Greece.

³ In the time of Socrates it appears even to have been adopted as a profession. Of this the well-known anecdote of the decision of Zopyrus, on the real character of Socrates himself judging from his countenance, is sufficient evidence. Plato mentions the subject; and by Aristotle it is formally treated of in a book allotted to the purpose.

⁴ It may be worth while to give a brief outline of Aristotle's sentiments on the subject. General outline of Aristotle's opinions on this subject.

Physiognomy, he in substance observes, had been treated of in three ways: Some philosophers classed animals into genera, and ascribed to each genus a certain mental disposition corresponding to their corporeal appearance. Others made a farther distinction of dividing the genera into species. Among men, for instance, they distinguished the Thracians, the Scythians, the Egyptians, and whatever nations were strikingly different in manners and habits, to whom accordingly they assigned the distinctive physiognomical characteristics. A third set of physiognomists judged of the actions and manners of the individual, and presumed that certain manners proceeded from certain dispositions. But the method of treating the subject adopted by Aristotle himself was this: A peculiar form of body is invariably accompanied by a peculiar disposition.

(A) They'll find it the physiognomies
Of th' planets all mens destinies.

HUDIBRAS.

disposition of mind; a human intellect is never found in the corporeal form of a beast. The mind and body reciprocally affect each other: thus in intoxication and mania the mind exhibits the affections of the body; and in fear, joy, &c. the body displays the affections of the mind.

From such facts he argues, that when in man a particular bodily character appears, which by prior experience and observation has been found uniformly accompanied by a certain mental disposition, with which therefore it must have been necessarily connected; we are intitled in all such cases to infer the disposition from the appearance. Our observations, he conceives, may be drawn from other animals as well as from men: for as a lion possesses a bodily form and mental character, a hare another, the corporeal characteristics of the lion, such as strong hair, deep voice, large extremities, discernible in a human creature, denote the strength and courage of that noble animal; while the slender extremities, soft down, and other features of the hare, visible in a man, betray the mental character of that pusillanimous creature.

Upon this principle Aristotle treats of the corporeal features of man, and the correspondent dispositions, so far as observed: he illustrates them by the analogy just mentioned, and in some instances attempts to account for them by physiological reasoning.

At the early period in which Aristotle wrote, his theory, plausible certainly, and even probable, displays his usual penetration and a considerable store of knowledge. He distinctly notices individual physiognomy, national physiognomy, and comparative physiognomy. The state of knowledge in his time did not admit of a complete elucidation of his general principles; on that account his enumeration of particular observations and precepts is by no means so well founded or so accurate as his method of study. Even his style, concise and energetic, was inimical to the subject; which, to be made clearly comprehensible, must require frequent paraphrases. Aristotle's performance, however, so far as it is, has been taken as the groundwork and model of every physiognomical treatise that has since appeared.

The imitators of this great man in the 16th and 17th centuries have even copied his language and manner, which are sententious, indiscriminate, and obscure. His comparative physiognomy of men with beasts has been frequently though not universally adopted. Besides his treasure expressly on the subject, many incidental observations on physiognomy will be found interspersed through his other works, particularly in his history of animals.

Next after Aristotle, his disciple and successor Theophrastus would deserve to be particularly mentioned as a writer on the subject in question. His ethnic characters, a singular and entertaining performance, composed at the age of 60, form a distinct treatise on a most important branch of physiognomy, the *physiognomy of manners*: but the translations and imitations of La Bruyere are so excellent, that by referring to them we do greater justice than would otherwise be in our power, both to Theophrastus and to our readers. We cannot, however, omit observing, that the accuracy of

observation and liveliness of description displayed in the work of Theophrastus will preserve it high in classical rank, while the science of men and the prominent characteristics of human society continue to be objects of attention.

Polemion of Athens, Alcamandrus the Sophist, and other several others, wrote on the subject about the same period. Lately there was published a collection of all the Greek authors on physiognomy: the book is intitled, *Physiognomiae veteris scriptores Græci. Græc. & Lat. a Franco Aitzeb. 1780. 8vo.* From the number of these authors, it appears that the science was much cultivated in Greece, but the professors seem soon to have contented with it something of the marvellous. This we have cause to suspect from the story told by Apion of the Apelles: *Imaginem adeo similitudinis indigere pinxit, ut marvellous (incredible dicit) Apion Grammaticus Scipionem aliquem quandam ex facie hominum adliantem, ut patrum, ut parentum, et in his dixit, ad futura notum, ut patrum, ut parentum.* The nobilities of the Pythagorean school were indebted to the physiognomical observation of their teachers, and it is probable the first physiognomists by profession among the Greeks were of this sect. They, too, to whom, from the nature of their doctrines and discipline, mystery was familiar, were the first, it is likely, who expiated the science of physiognomy in Greece to disgrace, by blending with it the art of divination.

From the period of which we have been treating to the close of the Roman republic, nothing worthy of remark occurs in the literary history of physiognomy. About the last mentioned era, however, and from thence to the decline of the empire under the later emperors, the science appears to have been cultivated as an important branch of erudition, and assumed as a profession by persons who had acquired a superior knowledge in it.

In the works of Hippocrates and Galen, many physiognomical observations occur. Cæsar appears to have been peculiarly attached to the science. In his oration against Piso, and in that in favour of Roscius, the reader will at the same time perceive in what manner the orator employs physiognomy to his purposes, and find a curious instance of the ancient manner of oratorical abuse.

Many physiognomical remarks are to be found likewise in the writings of Sallust, Suetonius, Seneca, Pliny, Aulus Gellius, Petronius, Plutarch, and others.

That in the Roman empire the science was practised as a profession, ample evidence appears in the writings of several of the authors just mentioned. Suetonius, for instance, in his *Life of Tiberius*, mentions that Narcissus employed a physiognomist to examine the features of Britannicus, who predicted that Britannicus would not succeed, but that the empire would devolve on Titus.

The science of physiognomy shared the same fate with all others, when the Roman empire was overwhelmed with the northern barbarians. About the beginning of the sixteenth century it began again to be noticed.—From that time till the close of the seventeenth, it was one of the most fashionable studies. Within that space have appeared almost all the approved modern authors on the subject (B.)

It

(B) They are, Parthelem. Cockes, Baptista Porta, Hieronimus Niquetius. Jacobus de Lacagne, Albertus. Michael

It has been unfortunate for physiognomy, that by means of their writers it was led to be connected with doctrines in which the philosophy of the present day would be ashamed. With these doctrines it had almost ceased to exist.

In every period of the history of literature there may easily be marked a prevalence of particular studies. In the early period, for instance, of Grecian literature, *mathematical morality* claimed the chief attention of the philosophers. In the more advanced state of learning in Greece and in Rome, *poetry, history, and oratory*, held the pre-eminence. Under the latter emperors, and for some time afterwards, the history of *theological controversies* occupied the greatest part of works of the learned. Next succeeded *metaphysics*, and *metaphysical theology*. These gave place to *alchemy, magic, judicial astrology*, the doctrine of signatures and sympathies, the *magick, theosophic, and Resurrection theology*, with physiognomy. Such were the pursuits contemporary with the science which is the object of our present inquiry. It is no matter of surprise, that, so associated, it should have fallen into contempt. It is not unusual for mankind hastily to reject valuable opinions, when accidentally or artificially connected with others which are absurd and untenable. Of the truth of this remark, the history of theology, and the present tone of theological opinions in Europe, furnish a pregnant example.

To physiognomy, and the exploded sciences last mentioned, succeeded *classic philology*; which gave place to *modern poetry and natural philosophy*; to which recently have been added the studies of *rational theology, chemistry, the philosophy of history, the history of man, and the science of politics*.

About the commencement of the eighteenth century, and thence forward, the occult sciences, as they are termed, had declined very considerably in the estimation of the learned; and those who treated of physiognomy forbore to disgrace it by a connection with those branches of ideal learning with which formerly it had been invariably conjoined. In Britain, Dr Gwither noticed it with approbation.—His remarks are published in the *Philosophical Transactions*, vol. xviii.; and Dr Parsons chose it for the subject of the Croonian lectures, published at first in the second supplement to the 44th volume of the *Philosophical Transactions*, and afterwards (1747) in a separate treatise, entitled *Human Physiognomy explained*.

The observations, however, of these writers, as well as of Lancelotus, Haller, and Buffon, relate rather to the transient expression of the passions than to the permanent features of the face and body. The well-known characters of Le Brun likewise are illustrative of the transient physiognomy, or (as it is termed) *pathognomy*.—See *Passions in Painting*.

During the present century, although physiognomy has been now and then attended to, nothing of importance appeared on the subject till the discussion already

mentioned between Pernetty and Le Cat, in the *Berlin Transactions*. The sentences of these authors, in so far as relates to the *definition* of physiognomy, have been above noticed. Their essays are besides employed in discussing the following questions: 1st, Whether it would or would not be advantageous to society, were the character, disposition, and abilities, of each individual so marked in his appearance as to be discovered with certainty?

2^{da}, Whether, on the supposition that by the highest possible proficiency in physiognomy, we could attain a knowledge in part only of the internal character, it would be advantageous to society to cultivate the study, mankind being in general imperfect physiognomists?

No reasoning *a priori* can possibly determine these questions. Time and experience alone must ascertain the degree of influence which any particular acquisition of knowledge would have on the manners and characters of mankind; but it is difficult to conceive how the *result* of any portion of knowledge, formerly unknown, and which mankind would be *permitted* to discover, could be any thing but beneficial.

Soon after this controversy in the *Berlin Transactions*, appeared the great work of M. Lavater, dean of Zurich, which has excited no inconsiderable portion of attention in the literary world. The work itself is magnificent: that circumstance, as well as the nature of the subject, which was supposed to be fanciful, have contributed to extend its fame; and certainly, if we may judge, the book, though many faults may be detected in it, is the most important of any that has appeared on the subject since the days of Aristotle. Lavater professes not to give a complete synthetical treatise on physiognomy, but, aware that the science is yet in its infancy, he exhibits fragments only illustrative of its different parts. His performance is no doubt desultory and unconnected. It contains, however, many particulars much superior to any thing that had ever before appeared on the subject.

With the scholastic and systematic method adopted by the physiognomists of the last and preceding centuries, Lavater has rejected their manner of writing, which was dry, concise, indeterminate, and general: his remarks, on the contrary, are for the most part precise and particular, frequently founded on distinctions extremely acute. He has omitted entirely (as was to be expected from a writer of the present day) the astrological reveries, and such like, which deform the writings of former physiognomists; and he has with much propriety deduced his physiognomical observations but seldom from anatomical or physiological reasoning. Such reasoning may perhaps at some future period become important; but at present our knowledge of facts, although extensive, is not so universal as to become the stable foundation of particular deductions. Lavater has illustrated his remarks by engravings; a method first adopted by Baptista Porta.—
Lavater's

Michael Schottus, Gaspar Schottus, Cardan, Taftnerus, Fludd, Behmen, Barclay, Claromontius, Conringius, the commentaries of Augustin Niphus, and Camillus Balbus on the *Physiognomica* of Aristotle, — S. Oltanus, Andreas Henricus, Joannes Digander, Rud. Goclenius, Alex. Achillius, Joh. Prætorius, Jo. Belot, Guliel. Gratalorus, &c. They are noticed in the *Polyhistor*, of Morhoff, vol. i. lib. 1. cap. 15. § 4. and vol. ii. lib. 2. cap. 1. § 4.

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11
The observations of the writers of the present century on this subject.

12
We find nothing very important of the controversy between Pernetty and Le Cat.

13
Lavater's celebrated work.

Lavater's engravings are very numerous, often expressive, and tolerably executed.

The opinions of this celebrated physiognomist are evidently the result of actual observation. He appears indeed to have made the science his peculiar study, and the grand pursuit of his life. His penicence exhibits an extended comprehension of the subject, by a particular attention to *facial* physiognomy, and the effect of *profiles* and *contours*. His style in general is forcible and lively, although somewhat declamatory and digressive. His expressions are frequently precise, and strikingly characteristic; and the spirit of piety and benevolence which pervade the whole performance render it highly interesting.

The defects of the work, however, detract much from the weight which Lavater's opinions might otherwise challenge. His imagination has frequently so far outstript his judgment, that an ordinary reader would often be apt to reject the whole system as the extravagant reverie of an ingenious theorist. He has clothed his favourite science in that affected mysterious air of importance which was so usual with his predecessors, and descends the whole material world to be objects of the universal dominion of physiognomy*. He whimsically conceives it necessary for a physiognomist to be a well-shaped handsome man†. He employs a language which is often much too peremptory and decisive, disproportioned to the real substance of his remarks, or to the occasion of making them. The remarks themselves are frequently opposite in appearance to common observation, and yet unsupported by any illustrations of his.

Lavater certainly errs in bestowing too great a reliance on single features, as the foundation of decision on character. His opinions on the physiognomy of the ears, hands, nails, and feet, of the human species, on hand-writing, on the physiognomy of birds, insects, reptiles, and fishes, are obviously premature, as hitherto no sufficient number of accurate observations have been made, in regard to either of these particulars, to authorize any conclusion. He has erred in the opposite extreme, when treating of the important topic of national physiognomy, where he has by no means professed the subject so far as facts might have warranted. We must farther take the liberty to object to the frequent introduction of the author's own physiognomy throughout the course of his work. His singular remarks on his own face do not serve to prejudice the reader in favour of his judgment, however much his character may justify the truth of them. We must regret likewise, for the credit of the science, that the author's singularly fanciful theory of apparitions should so nearly resemble a revival of the antiquated opinions of the sympathists.

To these blemishes, which we have reluctantly enumerated, perhaps may be added that high impassioned tone of enthusiasm in favour of his science everywhere displayed throughout the work of this author, which is certainly very opposite to the cool patient investigation befitting philosophy. To that enthusiasm, however, it is probable that in this instance (as is indeed, no unfrequent effect of enthusiasm) we are indebted for the excellency which the author has attained in his pursuit; and it possesses the salutary tendency of put-

ting us on our guard against a too implicit acquiescence in his physiological decisions.

In the Berlin Transactions for 1775, there appears a formal attack upon Lavater's work by M. Formey. This essay we have already mentioned. After disputing the propriety of the extensive signification applied by Lavater and Pernetty to the term *physiognomy*, M. Formey adopts nearly the same definition which we conceive to be the most proper, and which we have put down as such near the beginning of this article. He allows that the mental character is intimately connected with, and sensibly influenced by, every fibre of the body; but his principal argument against physiognomy is, that the human frame is liable to innumerable accidents, by which it may be changed in its external appearance, without any correspondent change of the disposition; so that it surpasses the extent of the skill of mortals to distinguish the modifications of feature that are natural from those which may be accidental. Although, therefore, the science of physiognomy may be founded in truth, he infers that the Deity only can exercise it.

M. Formey further contends, that education, diet, climate, and sudden emotions, may even the temperaments of ancestors, affect the cast of human features; so that the influence of mental character on these features may be so involved with, or hidden by, accidental circumstances, that the study of physiognomy must ever be attended by hopeless uncertainty. These objections are worthy of notice, but they are by no means conclusive.

We shall give a specimen of M. Lavater's manner of treating the subject on the opposite side of the question: a specimen, not in Lavater's precise words, but conveying more shortly an idea at once of his sentiments, and of his manner of expressing them.

No study, says he, excepting mathematics, more justly deserves to be termed a science than physiognomy. It is a department of physics, including theology and belles lettres, and in the same manner with these sciences may be reduced to rule. It may acquire a fixed and appropriate character; it may be communicated and taught.

Truth or knowledge, explained by fixed principles, becomes science. Words, lines, rules, definitions, are the medium of communication. The question, then, with respect to physiognomy, will thus be fairly stated. Can the striking and marked differences which are visible between one human face, one human form, and another, be explained, not by obscure and confused conceptions, but by certain characters, signs, and expressions? Are these signs capable of communicating the vigour or imbecility, the sickness or health, of the body; the wisdom, the folly, the magnanimity, the meanness, the virtue, or the vice, of the mind?

It is only to a certain extent that even the experimental philosopher can pursue his researches. The active and vigorous mind, employed in such studies, will often form conceptions which he shall be incapable of expressing in words, so as to communicate his ideas to the feeble mind, which was itself unable to make the discovery: but the lofty, the exalted mind, which soars beyond all written rule, which possesses feelings

and energies relucible to no law, must be pronounced unscientific.

21
physiognomy is a science which may be defined and communicated. Of the truth of the science there cannot exist a doubt. Every countenance, every form, every created existence, is individually distinct, as well as different, in respect of its, race, and kind. No one being in nature is precisely similar to another. This proposition, in so far as regards man, is the foundation-stone of physiognomy. There may exist an intimate analogy, a striking similarity, between two men, who yet being brought together, and accurately compared, will appear to be remarkably different. No two minds perfectly resemble each other. Now, is it possible to doubt that there must be a certain native analogy between the external varieties of countenance and form and the internal varieties of the mind? By anger the muscles are rendered protuberant: Are not, then, the angry mind, and the protuberant muscles, as cause and effect? The man of acute wit has frequently a quick and lively eye. Is it possible to resist the conclusion, that between such a mind and such a countenance there is a determinate relation?

Every thing in nature is estimated by its physiognomy; that is, its external appearance. The trader judges by the colour, the fineness, the exterior, the *physiognomy* of every article of traffic; and he at once decides that the buyer "has an honest look," or "a pleasing or forbidding countenance."

22
This knowledge, however improved, would not be detrimental to man.

That knowledge and science are detrimental to man, that a state of rudeness and ignorance are preferable and productive of more happiness, are tenets now deservedly exploded. They do not merit serious opposition. The extension and increase of knowledge, then, is an object of importance to man: and what object can be so important as the knowledge of man himself? If knowledge can influence his happiness, the knowledge of himself must influence it the most. This useful knowledge is the peculiar province of the science of physiognomy. To conceive a just idea of the advantages of physiognomy, let us for a moment suppose that all physiognomical knowledge were totally forgotten among men; what confusion, what uncertainty, what numberless mistakes, would be the consequence? Men destined to live in society must hold mutual intercourse. The knowledge of man imparts to this intercourse its spirit, its pleasures, its advantages.

23
It affords great mental gratification.

Physiognomy is a source of pure and exalted mental gratification. It affords a new view of the perfection of Deity; it displays a new scene of harmony and beauty in his works; it reveals internal motives, which without it would only have been discovered in the world to come. The physiognomist distinguishes accurately the permanent from the habitual, the habitual from the accidental, in character. Difficulties, no doubt, attend the study of this science. The most minute shades, scarcely discernible to the unexperienced eye, denote often total opposition of character. A small inflexion, diminution, lengthening or sharpening, even though but of a hair's breadth, may alter in an astonishing degree the expression of countenance and character. How difficult then, how impossible indeed, must this variety of the same countenance render precision? The seat of character is often so hidden, so mask-

24
Difficulties in the study

ed, that it can only be detected in certain, perhaps uncommon, positions of countenance. These positions may be so quickly changed, the signs may so instantaneously disappear, and their impression on the mind of the observer may be so slight, or their distinguishing traits themselves so difficult to seize, that it shall be impossible to paint them or describe them in language. Innumerable great and small accidents, whether physical or moral, various incidents and passions, the diversity of dress, of position, of light or shade, tend to display the countenance often in so disadvantageous a point of view, that the physiognomist is betrayed into an erroneous judgment of the true qualities of the countenance and character. Such causes often occasion him to overlook the essential traits of character, and to form a decision on what is purely accidental.—How surprisingly, for instance, may the smallpox disfigure the countenance, and destroy or confound, or render imperceptible, traits otherwise the most decisive?

We shall, then, continues Lavater, grant to the opposer of physiognomy all he can ask; and yet we do not live without hopes that many of the difficulties shall be resolved which at first appeared inexplicable.

He then proceeds to a specific illustration of his subject under a great variety of titles, in which he treats of human nature in general, and of each particular feature separately.

To enumerate the different divisions of his book would not be more satisfactory to our readers than the perusal of the *contents* of the book itself; and an attempt to epitomize even the essential substance of the vast multiplicity of matter contained in his essays, (which are yet only *fragments*, and to which indeed he himself does not pretend to give any higher appellation), would extend this article to a disproportionate length. Such an abridgement, after all, would convey no solid information on a subject which merits all the time and study that an attentive perusal of Lavater's works at large would require.

From the historical deduction of the literary progress of physiognomy which we have thus attempted to lay before our readers, it appears, that although the science has fallen into dispute, there can scarcely be mentioned a period in which any cultivation of science took place when physiognomy was not likewise the study, nay sometimes even the profession, of men of the most eminent abilities and the greatest learning.

The reasons why at present so little attention is paid to the subject probably are,

1st, That it has been treated in conjunction with subjects now with propriety exploded: And,

2^{dly}, That it has been injured by the injudicious assertions and arguments of those who have undertaken its defence.

Sometimes, however, the wise and the learned may err. The use of any thing must not be rejected for no better reason than that it is capable of abuse. Perhaps the era is not distant when physiognomy shall be reinstated in the rank which she merits among the valuable branches of human knowledge, and be studied with that degree of attention and perseverance which a subject deserves so essentially connected with the science of man.

That there is an intimate relation between the different positions

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May or day be varied.

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The natural work.

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Probably causes the difference in which science fallen.

28
There is a relation between the dispositions of the mind and the features of the face.

positions of the mind and the features of the countenance is a fact which cannot be questioned. He who is sinking under a load of grief for the death of an affectionate wife or a dutiful child, has a very different cast of features from the man who is happy in the prospect of meeting his mistress. A person boiling with anger has a threatening air in his countenance, which the most heedless observer never mistakes; and if any particular disposition be indulged till it become habi-

tual, there cannot be a doubt but that the corresponding traces will be so fixed in the face as to be discernible by the skilful physiognomist, under every effort made to disguise them. But when we attempt to decide on a man's intellectual power, by the rules of this science, we are often deceived; and in this respect we have reason to believe that Lavater himself has fallen into the grossest mistakes.

P H Y S I O L O G Y,

1
Definition.

IS a Greek word, which, in strict etymology, signifies that which discourses of nature: but in its common use, it is restricted to that branch of physical science which treats of the different functions and properties of living bodies; while by living bodies are meant those which are by a certain organized structure enabled to grow and propagate their kind.

By this definition, physiology must necessarily have for its object the explanation of that internal organical economy in plants and animals, which nature has devised for the preservation of the individual, and for the continuance and propagation of the species.

2
Division.

It is naturally divided into two kinds, particular and general. The former treats of the properties and functions of the individual or species, as may be seen in the article ANATOMY; the latter is the subject of our present discussion, and treats of those functions and properties which are general or common to all living bodies.

3
Utility of physiology.

To the genuine naturalist no subject presents such a field of amusement and instruction. When as complete as the state of cotemporary science will admit, it will exhibit a general result of all those experiments and observations that have purposely been made or occasionally contributed to illustrate the phenomena of animated matter; and when it shall reach that summit of perfection to which the efforts of genius may carry it, it may be enabled to diffuse a light, of which the naturalist of the present day can have no just or adequate conception: Particularly in physic, anatomy, botany, and in natural history, its happy effects may be numerous and great. On many occasions it may there introduce order for confusion, certainty for doubt; and may be expected to enthrone science in various places which are now occupied by fancy and conjecture.

4
Its near approach to metaphysics, and the difference pointed out.

Of all the branches of physical science it certainly makes the nearest approach to the region of metaphysics; but yet there is a difference between these, though it may not be very easy to point out the precise line of termination. Physiology, as already defined, being that science which has for its object the organical economy of living bodies, the word organical, we think, here should mark the distinction.

Wherever the economy of living bodies indicates design, and cannot result from any combination or structure of organs, it must be supposed the effect of something different from matter, and whose explanation belongs to that which is called metaphysics, or which we might term the *philosophy of mind*. By ascribing indeed to the glandular contents within the cranium and to

that fiction animal spirits, the motives of action, the superficial and ill informed may have been led to an opinion that perception, memory, and imagination, are the functions of the cerebrum, the medulla oblongata, and cerebellum; that the soul is a consequence of organization; and the science which treats of it only a particular branch of physiology. But mind and its faculties are now so well understood and investigated, that this opinion can seldom prevail but where penetration is not remarkable for its acuteness, or where reflection, reading, and research, have long been confined within the limits of a narrow circle.

Instead of mind being the effect of organization, we readily allow that every living system of organs supposes mind, and that in the study of such systems the physiologist must often meet with many phenomena that are less singular than simple perception, and yet for which he cannot account by any knowledge which he possesses of organic powers. This truth we partly acknowledge, when, like ancient Athens erecting her altars to unknown gods, we retreat to those asylums of ignorance, the *vis insita*, the *vis nervæ*, the *vis vitalis*, the *vis medicatrix*, and a number of others of the same kind.

We choose here to mark precisely the bounds of physiology, because we have always been led to imagine that it would be extremely fortunate for science that all its divisions were accurately defined, that each of them were restricted to its own sphere, where alone it is useful, and were never allowed to make encroachments on the province of another, where its only tendency can be to mislead and subvert all ideas of a judgement.

In its progress of improvement, physiology has been much and often retarded from a want of attention to this circumstance. The time has been when its place was occupied almost entirely by an absurd and ridiculous philosophy, which accounted for every thing by an hypothesis, and which pretended to cure wounds a hundred miles distant by a powder of sympathy.

Nay, as if its nature were not yet ascertained, in some books whose titles promise much instruction on the functions of organs, we meet with only a pleasing account of design and intelligence, and a few lessons, when the fancy is warm, how to exclaim and how we should wonder; or, after similar professions in the titles of others, we are presented with only a curious display of the art of logic. To a fact or two we see numerous chains of reasoning appended. On these chains are hanging important and general conclusions; and these conclusions afterwards undergo a tedious and elaborate

Preliminary observations.

5
The bounds of physiology, and the consequences attending them.

6
Introduction of logic into physiology.

Preliminary observations.

borate system of pathology. The whole has a wonderfully specious appearance; but upon applying the touchstone of experiment, the system falls, the conclusions turn out to be false, the chains are found connected with the fact by only a conjecture or some popular opinion of the time; most of their links are creations of fancy, and their joinings such logical associations as have no analogy or prototype in nature.

7
And of mathematics.

Instead of logic, however, a pompous parade of mathematical learning has been sometimes introduced. This has always an imposing aspect, and its presence here may require to be examined with some care. It must be allowed, that it would have indeed been rather surprising if logic and metaphysics had been employed, and mathematics carrying science in their name had not been thought of. Their character had always been deservedly high; and there was scarcely a department of knowledge to which they had not in some respect contributed their aid: their researches, too, had not been confined to mere number and quantity alone; they had explained the momentum of bodies, and all those motions which arise from percussion and gravitation; they had ascertained the distance of the stars, the velocity, magnitude, and orbits of the planets; they had accounted for the phases of the moon, the phenomena of eclipses, and return of comets; and bringing their knowledge from the heavens to the earth, they had shown the causes of the days and nights, of the years and the seasons, in all their varieties throughout the globe: they had taught the chronologer how to dispose of the periods of time, and how he might best assist the historian to arrange his events: they had pointed out the origin of tides; had informed the mariner how to direct his course through the ocean; and had taught the geographer how to describe the regions of the earth, and assist the traveller in his laudable pursuits after knowledge and science: they, in short, had unfolded the wonders of mechanism; and, diffusing light over every branch of that philosophy which is called *mechanical*, and has long been dignified with the name of *natural*, had afforded the finest specimens of reasoning with which the human mind is acquainted.

8
Introduced by Bellini.

A science of such distinguished utility could hardly fail to excite the admiration of all who knew it, or even had heard of it. And at a period when it was fashionable, it was scarcely possible for the physiologist to pass it unnoticed: the truth is, he very soon discovered its excellency. Bellini of Florence first introduced it; and it was at last so warped with physiology, that there were some who could hardly conceive a physiology existing without it. The justly celebrated Professor Borelli, one of its most enthusiastic admirers, employed it so well in showing how the muscles acted as ropes and the bones as levers, that he thence explained with the happiest effect the phenomena of standing, of walking, of leaping, of flying, and of swimming, in different animals: this task he performed in the first part of his famous work *De Motu Animalium*. But, wishing to know more of the animal economy, and feeling himself inspired with new hopes, he ventured in the second to explain also in the same way the interior motions and their proximate causes on the principles of mechanism: he there gives a minute account of the motion of the muscles, of the heart and its pulsation, of the circulating blood, of the office of the lungs, the kid-

neys, and the liver, of the nervous fluid and the seminal secretion; of vegetation, generation, nutrition, of hunger and thirst, of pain, of lassitude, and the heat of fever.

Preliminary observations.

Mathematics by him were considered as almost universal interpreters; for except the mechanical he seemed to acknowledge no other secondary powers in nature. He thought, with Plato, that God himself was always geometrising; and was fully persuaded that physical knowledge could not be acquired but through the medium of geometrical demonstrations and forms. These opinions had begun to be general, when his learned work was published at Rome in the year 1676; and they were no unequivocal symptoms that the reigning philosophy of that time was now in the last stage of decay.

Still, however, as the spirit of that philosophy was not wholly extinguished, physiology continued to be much infested with its metaphysical and logical disputes, and with its physical doctrines of forms of particular ferments, its antipathies, sympathies, its occult qualities, and subtle atoms.

For these reasons, in his inaugural dissertation at Leyden, delivered in the year 1692, the learned Pitcairn expresses a wish that medicine were made a distinct science; that it were established on mechanical principles, on fewer postulates, and more data; and that it were supported by a clear train of mathematical reasoning, which would defy the attacks of the sophist, and which would not be liable to the fluctuations of opinion and prejudice. These sentiments were warmly supported by the great Boerhaave, who, in his aphorisms, has founded his reasonings on the structure of the parts and the laws of mechanics, and to whom an edition of Borelli was dedicated in 1710.

10
By Pitcairn and others.

Pitcairn, however, was not content with barely expressing his wishes. Seeing with regret that the state of medicine could never be improved as long as it was connected with the philosophy which was then in fashion, he seemed anxious to effect a separation; and for such a step he wished to have only some plausible pretext. This pretext was not long wanting; and was, to be sure, one of the most whimsical that could well have presented itself to his fancy. It occurred to him that the study of medicine was prior to philosophy; that it had begun its course with astronomy, at the time when diseases were supposed the consequence of offended Deity; that all along, as it had shared the fate of astronomy, and had equally suffered in the common disgrace of judicial astrology, it was highly reasonable, in his opinion, that it should still follow the fate of its friend; that it should be established on similar principles, and should be demonstrated by that reasoning which might experience the shock of ages without being moved. So attached was he to the geometrical mode of demonstration, that in his dissertations he appeared to consider it as indeed the only species of evidence, excepting the senses, that could be relied on. But here he was certainly venturing too far; so rash an opinion, and one which, had he previously consulted with prudence, might have been suppressed, was fatal to his cause. We must here therefore date the commencement of those attacks to which his system was afterwards exposed. Such an indiscreet species of pedantry was but ill calculated to procure a generally favourable reception for a book with so extraordinary a title as the *Physico-mathematical*

11
Abused.

9
Extended by Borelli.

Preliminary observations. *mathematical Elements of Medicine.* Many learned and ingenious men, the greater part of whose knowledge had depended chiefly on the evidence of testimony, were now disposed to examine, with a steady and awakened eye, his boasted demonstrations. The consequence was that which might have been expected: the result of their inquiries was wholly inauspicious to those new applications of geometry; they found that his facts and experiments were few, that his postulates were endless, and that no mathematical reasoning whatever could extract truth from a false hypothesis, or could fairly deduce a general conclusion from particular premises. The Doctor, they observed, had imposed upon himself, in imagining that either certainty or truth was naturally inherent in any mere geometrical forms; these forms, they said, had been often abused: Plato had thought them somewhat divine; the superstitious had employed them as charms; Pythagoras had made them the symbols of his creed; and even in the writings of the learned Professor himself they frequently served no other purpose but to give an air of importance to trites; to bestow on error the appearance of science; and to give a simple and a trite remark the look of research, and of acute and profound erudition.

12 Rejected. It is unnecessary to recal here the satirical wit, or more properly the scurrilous abuse, with which this system and its author were treated. The mechanic physiology has now sunk into such contempt, that the most illiterate affect to smile at the mention of its name; they seem to forget, or, what is more probable, they never knew, that it once was honoured with the great names of Borelli, Boerhaave, and Newton; and their reading perhaps cannot inform them that it was a noble step to improvement; that it explained the structure of the eye, the movement of the bone, and force of the muscle, and that it may yet perhaps be the means of many interesting discoveries in the living body: discoveries, however, which Heaven will reserve for other minds than those which it makes merely to receive the impressions of the day.

13 Perhaps too rashly. A frequent mistake into which the mechanical philosophers had fallen, was their hopes of being able to account for digestion by the muscular force and action of the stomach. The more they reasoned from this supposition, the more widely they wandered from the truth. A thought of Vallisneri, that in acting mechanically, the stomach was as liable to be affected as its contents, gave a hint to Reaumur. On this hint he began immediately a set of experiments; and from a number that were clear and decisive, concluded that digestion was performed by a solvent. Here was a fair introduction to chemistry; the action of solvents was never yet satisfactorily explained by mechanic powers. A new era therefore commences; and chemistry now, in physiological investigations, holds that place which was formerly possessed by geometry and mechanics.

14 Introduction of chemistry. Nor is chemistry undeserving of this rank. From a small beginning, and from modestly professing to observe merely the different phenomena which are the effects of heat and of mixture, it has risen like astronomy to the first eminence among the sciences. By its numerous researches it has found widely diffused over nature a variety of singularly active bodies, which are called *salts*. Of these salts it has noticed some which

change a blue vegetable tincture into green, and others which change that tincture into red: the former of these it has called *alkalis*, and the latter are known by the name of *acids*. It has observed, that when acids and alkalis are brought into contact, and either of them nearly in a fluid state, they encounter with violence, effervescence and heat, and form a salt, which being neither acid nor alkaline, is called *neutral*. It has been remarked that all these salts, whether volatile or fixed, whether fluid or concrete, have each permanently uniform characters; and that, though sometimes blended in a mixture, or made to vanish in a solution, yet when they are separated they resume their taste, their smell, their colour, and their form, and exhibit, as before, the same power in dissolving earths, metals, and stones, and in making inflammable bodies to smoke, to kindle, and explode with a loud noise. All, however, act not alike upon all bodies; those acids which dissolve iron remain quite harmless upon gold. And chemistry here has been led to observe that particular salts show a preference for particular bodies, that there is in them an appearance of choice, and that their character is never to be known but by studying their different elective attractions.

Besides salts, chemistry of late has also discovered a number of bodies that are still more wonderful, still more active, and some of them at least still more widely diffused over nature. These are certain aeriform fluids which are called *gases*: these gases, like the mind itself, are discernible only by their effects; all are elastic, and all are combined with the principle of heat. Their kinds are various; some are inflammable, some are saline and soluble in water, some are neither the one nor the other, and some distinguished by the name of *airs*, maintaining combustion and respiration: their importance is such that there is not a single process in chemistry, nor perhaps one regular process in nature, "in which the phenomena of the disengagement or fixation of heat, and the disengagement or fixation of elastic fluids, are not observed either separately or together." Two of these fluids compose water, two the nitric acid, two ammonia, and three of them are found in atmospheric air; one of them is thought, with a good deal of reason, to be the alkaligenous principle in bodies, and two of them to be the constituents of oil: the principle of acidity is already known to be one of the two which compose water. The same fluid oxidates metals, supports flame during combustion, communicates heat to the circulating blood, and maintains life in the act of respiration.

By that knowledge which it thus has acquired of salts and of gases, by its more ingenious modes of analysis, and by some discoveries which it has made concerning the nature of heat and of light, chemistry is now able to account for many phenomena that before were inexplicable. In France particularly it has been recently extending its researches with a good deal of ardour towards the phenomena of both the animal and vegetable kingdoms: it has there found its salt and its gases, its heat, and its light, active and busy.

It is more than a century since it observed that plants were nourished by pure water and atmospheric air; that from these alone they derived their extracts, their mucilage, their oil, their coal, their acids, their alkalis, and aroma. But since the discovery of different kinds

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observations.

of elastic fluids, it has farther remarked that they grow rapidly in hydrogenous gas (A), and in air mixed with carbonic acid; that affixed by light their leaves absorb hydrogen from water, carbone from the acid of which they are so fond; and thus decomposing the one and the other, disengage from both the oxygenous principle or vital air, and restore to the atmosphere salubrity and health.

19
Animal
powers.

Leaving vegetables, which, by analysis in close vessels and in red-hot pipes, it has reduced to hydrogen, oxygen, azote, and charcoal, it has made discoveries no less important in the animal kingdom. It has found that the food of the nobler animals, which immediately or remotely is prepared by vegetables, is generally acted upon by a solvent: it has proved by experiment that the animal organs can fix azote; can decompose atmospheric air; can form lime, iron, and carbonic acid, as well as vegetables, produce a number of saline substances, which no art could detect in their food. Nor is it here that such discoveries are meant to terminate; these seemingly creative powers of vegetation and of animalization, with other phenomena in the structure and economy of living bodies, chemistry imagines that it will yet be able to explain. We may safely venture, however, to predict that something more than its present knowledge of the various effects of heat and of mixture will in this case be found necessary to ensure success. The late discovery of elastic fluids and their singular properties afford the strongest reasons to suspect that we yet may be ignorant of many agents which nature employs in the functions of bodies. But whatever be the truth, we are almost certain that these agents discovered

20
Electricity
and magnetism.

by the chemists are not alone concerned. Electricity, magnetism, and what have been called animal electricity and animal magnetism, must not be excluded from acting some part. The growth of plants, it is well known, is considerably affected by the electrical state of the atmosphere; it is sensibly promoted by a proper use of the vegeto-electrometer, and has been said to indicate a difference between the negative and positive electricities, whether these be kinds or states of the fluid. Such too is our present knowledge, that electricity as yet seems the only cause to which we can ascribe the seeming chemical affinities of the dew; its constant practice in avoiding some bodies, its predilection for others, and particularly its attachment to the living points of plants and of leaves: nor is this electricity wholly unconnected with the animal kingdom; when we think of its singular fondness for points, it occurs that one intention of our hairs may probably have been to collect and diffuse it. It is plainly excited in cross rubbing the hair of some animals, and when we wear silk, it is frequently accumulated upon the surface of our own bodies.

The iron found in plants and in animals is certainly somewhat of a striking circumstance, and cannot be denied to be one reason why magnetism should not be wholly overlooked.

21
Animal
electricity.

As for animal electricity, or what has been called so, it is now, we believe, generally allowed to hold an important place in the system. It is very perceptible

in all those nerves which are subservient to voluntary motions; nor is it limited to these alone. In several instances where metals were applied to the nerves of the heart, which nature has destined to spontaneous motions, they were seen to awaken the dormant powers in the muscular fibres of that viscus. We here speak only of the nerves; but the Torpedo, the Gymnotus electricus, and Silurus electricus, possess a particular structure of organs for collecting this fluid, for discharging it at pleasure, and for giving a shock. If those who are accustomed to the common kind of electrical experiments, may at first be surprised that this electric fluid in the animal is not discharged from the nerves by water, or any other metallic conductor that is pure and unmixed, another fact, which is fully as striking, though it has not been hitherto mentioned by any observer known to us, appears to merit equal attention: Cut away the leg of a frog, uncover a part of the crural nerve, place the limb now on a table on which an electrifying machine is working, you will see the muscles strongly convulsed at every spark which you draw from the conductor, but remaining motionless upon the discharge of the Leyden phial.

22
And animal
magnetism.

Animal electricity naturally suggests animal magnetism. This last has been productive of more wonders in the human frame than all the preceding agents together. Under the management of Mesmer at Paris, and his pupil Deslon, it filled all who observed its effects with surprise and astonishment. It seemed to unhinge the powers of the mind, and affect the whole animal economy; it excited the most extraordinary emotions; it roused and allayed the different passions; it changed aversion into love, and love into aversion; it created pain, it healed wounds, and cured diseases as if by enchantment.

These discoveries were made by a quack, who knew not the cause by which he produced so singular appearances. The celebrated Franklin, who first supposed that the electrical fluid was the thunder, was placed at the head of those gentlemen who demonstrated that this species of magnetism was the same power that had long been known under the name of *imagination*.

This last discovery, if the blushing pride of modern philosophy could but stoop to improve an important hint, though originally suggested by an empiric, might greatly enlarge our knowledge of mind, and explain some things in the animal economy which appear yet to require a solution. At any rate, it sufficiently proves that the influence of mind is very extensive in the higher parts of animal creation. Many facts would argue that it increases as we rise in the scale: but the sole intention here was to show, that chemical agents are neither almighty nor everywhere present; that in the internal organical economy of living bodies they act but a part; and that, like the other agents in nature, they are obliged to confine their operations within those limits which the great Author of being has prescribed.

The aid which anatomy affords to physiology is now to be considered. Physiology in general and the use of anatomy in physiology.

23
The use of
anatomy in
physiology.

(A) Hydrogenous gas acts with more energy than any other substance in dissolving carbone; it mixes with carbonic acid and with azote, and sometimes holds in solution sulphur and phosphorus. See Fourcroy's Discourse on modern chemistry.

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study of anatomy are so closely connected, that, as Haller imagined, they can hardly be separated even in idea. In his opinion, the man who should attempt to become a physiologist without anatomy, would act as wisely as the mathematician who, without seeing the wheels or the pinions, or without knowing the size, the proportions, or the materials of any machine, would yet presume from mere calculation to determine its powers, its properties, and uses. In this comparison, the importance of anatomy, we are really persuaded, is not represented in a light too strong; nor does that medium through which it has been viewed appear to have magnified beyond nature.

24 Anatomy a distinguished branch of human knowledge.

Whether art or science, anatomy is one of those eminent accomplishments without which no one is able to prosecute his studies with half that pleasure and success which he might in either the animal or vegetable kingdoms. Having been always accustomed to assign it one of the highest and most honourable places among those branches of human knowledge which are styled liberal, we must be excused if we dwell a little in exposing an attempt to convert it to a craft.

25 The illiberality of some of its professors.

It is with surprise, and a mixture of regret, that we see a writer of distinguished merit wishing thus to degrade it, and seeking to confine it as well as physiology to that profession which chanced to be his own. The dignity of a science, which he considered as his glory and his pride, should have certainly extinguished in a generous mind the low and disgusting policy of his trade. It is indeed with reason that he thinks it unfortunate, "that those who, from the nature of their education, are best qualified to investigate the intricacies, and improve our knowledge of the animal economy, are compelled to get their living by the practice of a profession which is constant employment." We lament the misfortune as much as he can; but we reason not from it in the same way. Instead of complaining that "idle professional men," particularly "of the church, should become philosophers and physiologists as it were instinctively," we are happy to learn that men of enlightened and cultivated minds are thus so readily disposed to assist us; that nature conducts them as it were by instinct; and that happily they enjoy all that leisure which is deemed so necessary for such an undertaking. The genius of some, and the liberal education which they all must have had opportunities of acquiring, by no means impress us with any unfavourable ideas of their aid.

Our author allows them to look through microscopes and examine the red globules of the blood: They may too, he says, view animalculæ, and give us a candid relation of what they see; but should not presume to carry their reasoning into a science of which they can know nothing, or hope to throw light on a subject which it is impossible they can understand. But, to speak freely, after considering the great physiological discovery of Priestley with respect to *respiration*, the most important probably, not even excepting that of the *system of alveolents*, that the science has witnessed in the present age, we see no grounds for prescribing such laws or fixing such limits: and although he may treat the illustrious Reaumur and Abbé Spalanzani as nothing more than makers of experiments, and declare a resolution to place no confidence in those which are made by *gentlemen* and *priests*; he

will not certainly deny that others have as well as he a just right to think for themselves.

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Were such sentiments to become universal, it is difficult to say what would be the consequence. In this country, the law and the church require from their members a formal certificate, that, besides the professional, they have also attended some literary classes at the university. To our medical classes boys are admitted from the shop and from the school, and may afterwards pass the two colleges of surgeons and physicians, by exhibiting a little skill in their art, or at least by paying the stated fees. On these accounts, being anxious already for the fate of a profession which we respect, and considering the degeneracy to which it is exposed, not we hope the degeneracy into which it is sinking, we should be sorry to see it deprived of that respectability which it may derive from the countenance of men possessing general literature and science.

It is very true, that gentlemen and priests may not be anatomists; and not a few anatomical disputes might seem to insinuate, that persons may be very eminent anatomists without being either gentlemen or priests. Still, however, there is nothing incompatible in those characters; and, were we to judge from their writings, it was certainly a thing of which Bacon, Newton, and Locke, never dreamed, that the study of the priest, or the mere circumstance of being a gentleman, was to blunt their acuteness for physical research, or in after times to affect their reputation as men of genius.

"When men have begun to reason correctly (says Dr Hunter), and to exercise their own judgment upon their observations, there must be an end to delusions. Many doctrines of old physicians and of old women will meet with proper contempt; the tyranny of empty pomp and mystery of physic will be driven out of the land, and forced to seek shelter among less cultivated societies of men."

If the learned professions wish to be respected, let them respect each other: for our part, we esteem them all: and whatever assistance either they or others may afford to physiology, they may be assured that they will not find us anywise disposed to detract from its merit. Divested of prejudice, we value as highly the discovery of Priestley, which explains respiration, as if it had come from Albinus or Haller; and with as much readiness acknowledge obligations to the celebrated painter Leonardo da Vinci, as if he had been a doctor of physic. See ANATOMY, p. 667.

26

But while we are thus impartial to others, we would not be unjust to professional anatomists. Their labours and dissections, their patience, and ardour, have been great; and candour obliges us to assert their claim to the most numerous and important discoveries that have yet been made in physiological science. The pains which they have taken, the prejudices which they have surmounted, and those feelings which they have sacrificed in describing the parts of the dead body, place their labours beyond all praise.

But their discoveries have not been confined to a mere knowledge and description of parts. In the still fabric, just as in a time-piece or a broken mirror without motion, the whole presents a very confused and even an uninteresting appearance. In this case, should the man of reflection happen to ask, where are the organs of the different functions? all would be silence.

and

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and nothing would be found to make a reply to such an inquiry. The arterial system is relaxed and empty; the muscular fibre cannot be roused; the heart has ceased from its wonted beatings; and the nerve refuses to convey sensations. On this scene the eye of the anatomist could not be expected to dwell long with much satisfaction. Curiosity would induce him to look beyond it, and study the design. He would soon perceive, that to know the uses of the several parts, they must be seen alive and in action. But here new difficulties would arise, and feelings of compassion would excel in against any farther pursuit. The natural zeal, however, of inquiry, the good of mankind, and the love of science in a generous mind, are not easily resisted.

To his lasting praise, and the singular improvement of true physiology, the anatomist has examined the living body, and has there observed, that all motion proceed immediately from the muscular fibre; that the muscular fibre again derives its power from the nerve, which terminates in the brain; that fibre, and nerve, and the whole system, are nourished by the blood which comes from the heart; and that the waste of blood is supplied by the lacteals, which absorb nutritious matter from the food as it passes along the intestinal canal.

He has also observed, that the blood, which is in continual motion, has a circular course; that other vessels along with the lacteals are employed to absorb; and by means of injection has shown the route of the different fluids as clearly in the dead as they could have been seen in the living subject.

When his eyes have failed in tracing objects that were too minute for unaided sight, he has called in the help of the microscope, and discovered the red globules of the blood, animalculæ in the semen, and the anastomoses of the arteries and veins; and when the microscope could lead him no farther, he has had recourse to chemical analysis, and made discoveries equally important in demonstrating the bodies which compose the several fluids and the solids.

Besides these services which the anatomist has rendered to physiology, the science is likewise greatly indebted to him for those various and ingenious methods which he has taken to diffuse his knowledge. Whatever has occurred remarkable or rare, he has studied to preserve either dried or in fluids that resist putrefaction. By corroding the parts which he has injected in a certain acid, he has given an idea of the vascular system, which is at once instructive and elegant. Where it has been necessary to destroy the parts when incapable of preservation, or where the preservation would have been expensive, he has not neglected to represent them in models of wax, or to perpetuate them in accurate casts of lead or of stucco: and, lastly, that the valuable fruits of his labours might not be confined in his room of preparations or to his pupils, he has described most of them in drawings, has multiplied his drawings by correct engravings; he has even published his numerous engravings, and to render them intelligible, has illustrated each with copious explanations.

From this account it might be supposed that the anatomist has done all that can be reasonably expected from him. If we drew, however, such a conclusion, we might certainly be charged with precipitation. His views have hitherto been too confined, nor have they been directed with all that skill which a ra-

tional and comprehensive physiology would require. Preliminary. As if chiefly guided by the rant of the poet, that "the noblest study of mankind is man," he has cultivated his art principally with an eye to medicine and surgery; and while he has dissected the human body with a tedious minuteness, he has seldom looked into those of brutes but when he has wished to illustrate a theory or establish an hypothesis.

As some apology for such a conduct, there is indeed but little immediate or pecuniary advantage to be derived from comparative anatomy; and those who have heard of the fox and the grapes will readily perceive, that few will be disposed to commend a science which reflects not much credit on their knowledge, and which they are led from sentiments of pride to treat as either contemptible or useless. The decisive tone and affected air of superior discernment being not unusually a very tender part of the character, they often form that mark of distinction which is seldom resigned but with the utmost degree of reluctance. It is, however, allowed, that any opposition from these causes ought not to frighten an aspiring genius. His nobler mind should look beyond pecuniary prospects; and he ought to have fortitude enough to despise the sneers and malevolence of pompous ignorance. The other difficulties which he has to encounter in his own estimation may not be so small.

In seeking to enlarge the field of inquiry, he will soon experience that he wants a language, or at least a nomenclature fitted to express the different objects which must necessarily occur in his researches. He will find too that he wants those proper classifications of the animal kingdom, which are equally necessary both to abridge and direct his labours.

The first nomenclature of the anatomist was formed upon the dissection of brutes; and most of its terms, as the *rete mirabile*, are now useless, or tend to mislead those who employ them in their dissections of the human body. The few of its parts which still are retained, as the different names and divisions of the gut, are much more applicable to the usual appearances in certain quadrupeds, than to any thing which we meet with in man.

This first nomenclature declined with the studies which gave it birth, and with the decline of that superstition which permitted no other studies of the kind. Since the days of Vesalius the human body has been chiefly dissected; and the nomenclature which has thence arisen, and has since been assuming the form of a language, if adapted at all, is peculiarly adapted to that subject. Were we now therefore disposed to examine the internal economy of animals in general, we should see at once that the present nomenclature is as ill suited to comparative anatomy as the former nomenclature was to the dissection of the human body. The several facts which confirm this assertion are but too numerous. To give one or two: In a late work, *The Physiology of Fishes*, the celebrated author is obliged to inform his reader in a note, that when he makes use of the following terms, superior, inferior, anterior, and posterior, the fish is supposed to be standing erect in the attitude of man; and in his ingenious *Contemplation on Nature*, Bonnet, besides the absurd practice of calling nerve by the name of marrow, has been pleased to observe, that in certain insects the spinal marrow

27
The views of the anatomist are too confined.

28
Obstacles he way a more liberal study of anatomy.

29
The want of a nomenclature.

30
Origin of the anatomical nomenclature.

reliminary observations.
31 defects of the present nomenclature.

row is not in the spine, but in the opposite side of the body, running longitudinally along the breast.

Applying occasionally this nomenclature to the small number of birds and quadrupeds which we have dissected, it was much strained with respect to their skeletons. Even forced analogy could not bring it to express many distributions of the nerves and blood vessels; and when it was employed in naming the muscles, in most cases it turned out to be useless or absurd.

We were first led to observe its defects on hearing of the nameless bones of the pelvis, called the os ilium, the os ischium, and the os pubis, united behind by an os sacrum, which is tipped with a coccyx or bone of a cuckoo: we thought it likewise somewhat remarkable to find a goat, a boat, and a conch shell, among the external parts of the ear; and within the tympanum a hammer and its shaft, a stithy, a stirrup, and a periwinkle. But these defects were most seriously felt in raising the different muscles of a dog, and comparing them severally with Albinus's tables. These tables and muscles, to our great surprise, did not reflect that mutual light upon one another which we expected. To obtain here more accurate ideas we got the comparative myography of Douglas. At one glance the etymological table of this work demonstrated the confusion and the imperfection of the nomenclature. In his, as in other books of myography, the muscles are explained by describing their origins, insertions, and uses: but the table shows, that their names are never, excepting only in a few cases, derived from any of these three circumstances, which in every description are uniformly noticed in all muscles. Their names on the contrary are frequently taken from their particular form and appearance in the human body, or from those circumstances which are constantly varying in every animal; just as if muscles of the same origin, insertion, and use, should in all animals have a similar colour, a similar mode of insertion and origin, a similar composition and variety of parts, a similar course and direction of fibres, a similar figure and shape, a similar passage through certain places, a similar proportion with respect to one another, or should be formed of a similar substance.

If we pass to the membranes, as expressed in this nomenclature, we shall not discover that their names are more philosophical. A periosteum covers the bones, a pericranium the skull; the cavity of the thorax is lined with a pleura, that of the abdomen with a peritoneum; and what is surely somewhat remarkable, bones which are hollow have a periosteum on their inside: the membranes in the skull are by way of distinction denominated *mothers*; the one which lies next to the cranium is the dura mater or hard-hearted mother, while that which immediately enwraps the brain is the mater pia or the affectionate mother.

Of all the terms, however, that occur, the cavity of the skull contains the most extraordinary collection: we there meet with a Turkish saddle and with the feet

of a sea-horse, with a ring, with a lyre, with a sickle, with a bridge, with a writing pen, and a wine-press. A few of these names belong to the substance of the brain itself: where one part is called from its hardness the callous body, another from some fancied analogy the medullary substance, and a third from being on the outside is named the corticle, and from its colour the cineritious. These are not all: there are besides footstalks of the cerebrum and cerebellum; the thighs and arms and fore and hind legs of a grand division, the medulla oblongata; there is also a vault and two or three pillars, one pair of striated bodies, two beds, and a couple of horns; some cavities which, from a supposed resemblance to stomachs, are called ventricles choroid coats; two bodies, named from the olive, two from a pyramid, and one from a rine, which is chiefly remarkable for having once been thought the residence of the soul. At some distance in the cerebellum we are however pleased to meet with a name that is somewhat elegant, the *tree of life*. In this there is a degree of refinement, which must strike one as it comes unexpectedly. The following names are in the lowest style of obscenity: they are wormlike and mammillary processes, they are nates, testes, an anus, and a vulva; which, in order to save the blushes of our readers, we shall leave in the language in which they were conceived. A singular part is placed immediately under a funnel, and is named from its use the pituitary gland; it was meant originally to secrete a phlegm, but it holds that office now as a sinecure (B).

Ridiculous and whimsical as many of these appellations are, they generally have some allusion to their subject, and are by no means the most exceptionable in this nomenclature. The names of discoverers which have been imposed upon various parts, contain no description at all; and the only purpose which they can serve is not to promote the interest of science, but to immortalize the anatomists. As many of those have not been more than intangible to fame, they or their friends have taken the freedom to introduce parts to our notice, not by telling us what is their nature, but by demonstrating who was the first that observed them. Upon reading therefore the catalogue of names that occur in anatomy, one would imagine that many of these ingenious dissectors had supposed themselves not the discoverers but the inventors of several parts in the animal economy. In our vascular system is the ring of Willis, the vein of Galen, and the large wine-press of Herophilus. We have in our brain the bridge of Varolius; and in our nerves we possess the property of various discoverers. The holes of Vidius, and the caverns of Highmore, are in our bones; some small muscles in the sole of our foot is the fleshy mass of Jacobus Sylvius; a part of our eye is the membrane of Ruyfch; and in those cases where they are to be found, Couper lays claim to particular glands; two canals from our mouth to our ears are the tubes of Eustachius;

(B) That our readers may judge whether or not these names be fairly translated, we subjoin the originals here in a note. In the ear, *tragus, scapha, concha, malleus, incus, stapet, cochlea*: in the cavity of the skull, *fora Turcica, pedes hippocampi, annulus Willij, psallicoides vel lyra, sulci dura matris, pons Varolij, calamus scriptorius, torcular Herophilij, corpus callosum, substantia medullaris, substantia corticalis vel cinerea, pedunculi cerebri et cerebelli, femora, brachia, crura anteriora et posteriora medulla oblongata, fornix, corpora striata, thalami nervorum opticorum, cornua nervorum opticorum, corpora olivaria, corpora pyramidalia, glandula pinealis, arbor vitae, tubercula mammillaria, appendices vermiformes.*

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* *Morbus diabeti.*

32 The person most apt to perceive these defects.

33 Hints respecting a new nomenclature.

china; the duct of our pancreas is the right of Vir-sungus; Poupert has a ligament almost in our groin; a lobe of our liver belongs to Spigelius; and the female would certainly stare at being told, that among the distinguishing marks of her sex are the tubes of Fallopius, a trench's mouth, and several vestiges of the devil's teeth *.

The man who will readily observe the defects of this nomenclature is not he who has learned it already, and who no longer is acquiring his ideas through its imperfect and confused medium; nor is it he whose studies are confined to the human body, the particular subject on which it was formed: He who will sensibly feel its inconvenience is the young anatomist, who must receive his knowledge through its channel, commit its vocables to his memory, and use them afterwards in recalling his ideas. Another who must soon perceive its failings, is he who engages in comparative anatomy, and who is anxious to extend his views beyond that which the foolish indolence of conceited bombast has called the *microscopium*. A third will be he who has remarked the numerous synonyms which different authors have thought themselves warranted to substitute in place of the old terms: for these repeated attempts at amendment are a strong proof of that estimation in which it is held by the anatomical writers in general: And, lastly, that man cannot hesitate long to pass upon it a condemnatory sentence, who, like Wilkins, Locke, Condillac, and Reid, is a person of extensive and profound reflection, who is well acquainted with the intimate connection between accurate expressions and accurate ideas; who knows how much the improvements of language are able to facilitate the progress of science; or who has experienced the wondrous effects that have already resulted from the example and labours of Linnaeus, and particularly from the new nomenclature in chemistry, which can hardly be too much valued and admired.

Our intention here is not to suggest a particular plan for any new anatomical nomenclature: the state of our knowledge may in this respect be yet too imperfect, and perhaps it may be necessary to see more of the animal economy, before we should venture on such an undertaking. We may however, in general, observe, that this nomenclature, like the languages of nations, ought not to be formed with any view to an individual, a species, or genus; and after that be carelessly extended by fanciful analogies to new objects, and from these again be extended to others; thus making metaphor to spring out of metaphor without end, until the original figure be lost, and revived and lost again, times without number. It ought to contain as many as possible of those terms which, understood in their primary sense, might apply to the whole animal kingdom and living bodies, without any metaphorical expressions: if, in describing the tastes and colours, such expressions can be avoided. Instead of the words anterior, posterior, inferior, and superior, which are perpetually shifting their meaning with a change of attitude, it ought to have words of one constant invariable import, expressing the regions of the head and the back and their two opposites. These terms, with right and left, would be found in anatomy to answer nearly the same purpose that the degrees of longitude and latitude, or the points of the compass, do in geo-

graphy. Every part would then be considered as lying within or as pointing to six different regions, the right, the left, the head, the back, and their two opposites. If more particular descriptions were wanted, the definitive terms might then be taken from the more immediately surrounding parts; thus giving an account of the ethmoid bone, D'Azyr borrows the definitive words from the regions of the cranium, the sin-cipital, basilar, facial, and occipital; or from the regions in immediate contact, the cerebral, palatine, nasal, and sphenoidal.

If an object attainable, this nomenclature too should be derived from one origin, and not like the present be a wild incoherent Babylonish gibberish of a number of mixtures. It ought to aim at conveying its ideas with clearness and precision, and yet fully, concisely, and promptly. In point of simplicity it ought to study the ease of the memory in receiving, retaining, and in recollecting. To prevent a needless multiplicity of terms, it ought to avoid puerile minutiae, which serve no end but to render description tedious and confused; it ought to avoid such trivial divisions, as those of the gut into duodenum, jejunum, ileum; or those of the artery into subclavian, axillary, brachial; and, lastly, it ought to be formed on a plan containing certain rules of construction for giving names not only to parts already discovered, but to those parts which are still unknown, or which distinguish individual and species.

In imposing names, it might perhaps be of some advantage to examine not only together, but separately, the great constituent parts of the system; as the bones, the ligaments, the cartilages, the muscles, the membranes, and the glands; the nervous, the sanguiferous, and absorbent systems; and all these with their properties and uses perspicuously arranged. How far a regularity in composition, and a uniform variety of terminations, might be of use in this nomenclature, can best be conjectured from their great importance in the new philosophical language of chemistry.

It has been observed, that such a nomenclature, to encourage and assist the comparative anatomist, is still wanting; and it also was remarked, that we yet are unacquainted with proper classifications of animals, peculiarly fitted to direct and abridge the anatomist's labour, and to satisfy the inquiries of the physiologist.

Our present physiological arrangements are, like our nomenclature, principally suited to the human body. To take our instance from the celebrated Haller, he begins his Outlines with the simple fibre, and the cellular texture, of which he is anxious to compose as many of the solids as he can. He then proceeds to more of the organs, describing with great erudition and care their different uses and structure in man. These organs, however, which he describes, and those analogous with respect to their structure, are confined to a part of the animal creation. As different classes of the animal kingdom have with similar functions varieties of organs, and as one function is consequently performed in different ways, it is evident that organs ought not to form the general divisions in any physiological system of arrangement, because we should then have a new arrangement for every new species of organs. Of this truth Haller and others have not been ignorant. They have also divided their subject into functions;

Preliminary observations.

34 The present physiological arrangements are confined.

35 Two kinds of arrangement, according to the functions, or according to the organs.

Preliminary observations.

functions; but still they are functions in the manner performed by the human body. This body has engrossed so much of physiology, that we often see the functions explained with scarcely any allusion to their organs; as these are supposed to be always the same, and already known from the usual dissections.

36
Haller's physiology refers chiefly to the human body.

Haller's physiology is professedly that of the human body. His conduct here was seemingly the effect of general custom: it did not arise from any contempt of comparative anatomy. There have been few who esteemed it so highly, who have studied it more, or applied it so skillfully. He declares there are many parts of our bodies whose functions can never be fully explained, unless we examine their structure in quadrupeds, in birds, in fishes, and even in insects; though he therefore had dissected of human subjects to the number of 350, yet the number which he dissected of brutes, and what is more, dissected alive, was much greater. Numerous, however, as were his dissections, they were too confined for general physiology. That requires a range more extensive; and, to shorten the labour, different classifications of animals from any of those to be usually met with. This assertion hardly needs a proof.

37
Zoological and physiological arrangement.

There is nothing more certain, than that were the anatomist to dissect animals as they occur in the system of Linnæus, or any other naturalist, his toil would be immense, and the knowledge which he thence would acquire of functions would scarcely be found to bear to it even the smallest proportion. By this observation we mean not to object to those ingenious classifications which Linnæus and others have employed to facilitate the study of zoology. All their classifications may be useful; and many display that extent and clearness of comprehension, that distinguishing acuteness, and that laudable ardour for the interest of science, which ought to render their authors immortal, and intitle them to the gratitude of future ages. Yet these systems are formed with a view different from that which principally ought to direct the physiologist. They were meant to contain a full enumeration of the objects of zoology so far as known; to exhibit them arranged in different classes and subordinate divisions, according to such obvious and distinct marks as might strike at a glance, or appear on a cursory examination. To him who is entering on the study of zoology, they show at once the extent of his subject; they elevate his mind by the grandeur of the prospect; and when better employed than in pleasing the fancy or in rousing the rapturous feelings of a poet, they draw his attention to those significant and marked signs in which the language of nature is written. They assist his judgment in the art of arrangement, and give to his memory a power of recollection which it had

not before. To the natural historian they perform a service equally important, if not essential, to his undertaking: to him they supply the place of chronology; and instruct his readers by the chain of connection which they give to his thoughts, and by that perspicuity which they invariably bestow on his language.

These arrangements, however, with all their advantages, are not the arrangements which the physiologist would wish the anatomist to observe in his dissections. They are certainly useful in studying the manners, dispositions, and habits of different animals, and all that part of the outward economy which indicates something of their wisdom and design. But they little illustrate that internal structure on which this outward economy is founded, or tend to explain the more secret functions which, not depending on the will of the creature, only display the power and omniscience of him who made it. This consequence is easily conceived, from considering the difference between zoology and what has been here defined physiology. Zoology is chiefly led to examine the animal kingdom as it usually presents itself to the eye, including a great variety of objects; physiology only that single part of the animal economy which is chiefly made known by anatomy and chemistry. Zoology has been wont to divide its kingdom into so many classes or orders of animals; physiology would naturally divide its economy into so many functions. Zoology has subdivided its classes by certain obvious and exterior marks, as the teeth and the claws; physiology would naturally subdivide its functions by the many varieties of those organs which are destined to perform them, as the different kinds of lungs and of stomachs. Zoology but cursorily mentions the functions as forming a part of the history of animals; physiology takes notice of animals only when they are of use to illustrate its functions. From this comparison it will readily appear, that things which are primary in a zoological will often be secondary in a physiological species of arrangement; and that things which are primary in a physiological will often be no more than secondary objects in a zoological. This is very conspicuously the case in one of the grand divisions of Linnæus into mammalia, where the important secretory organs of the milky fluid are noticed only, like the colour of hair or the length of a tail, as a good outward mark of distinction; and likewise in the excellent table of D'Aubenton, where the function of digestion is not even alluded to at all; although he had complained that there was more of art than of nature in the common arrangements, that classification by outward marks had confounded things of a different structure, and that the lesser divisions should be made only by marks relating to the functions.

38
Difference between them.

Preliminary observations.

39
Daubenton's arrangement.

| A N I M A L S. | | | | | | | | | | |
|---|---------------------------------|---------------------|-------------------------------------|------------------------------|--|------------------------|----------------------------|--|------------------------------------|--|
| With a Head. | | | | | The most part without a Head. | | | | | |
| Nostrils. | | | | | Without Nostrils. | | | | | |
| Ears. | | | | | Without Ears. | | | | | |
| Two Ventricles in the Heart. | | | | | The Heart variously formed or unknown. | | | | | |
| Warm Blood. | | | | | A whitish Fluid instead of Blood. | | | | | |
| Inspiration and Expiration of the Air at short Intervals. | | | | | Inspiration and Expiration of the Air at long Intervals. | | Admission of Air by Gills. | | No apparent Entrance to admit air. | |
| Viviparous. | | | | | Oviparous. | | | | | |
| With Teats. | | | | | Without Teats. | | | | | |
| 1st Order.
QUADRUPEDS. | 2d Order.
CETACEOUS ANIMALS. | 3d Order.
BIRDS. | 4th Order.
OVIPAROUS QUADRUPEDS. | 5th Order.
SERPENTS. | 6th Order.
FISHES. | 7th Order.
INSECTS. | 8th Order.
WORMS. | | | |
| Four Feet and hairy Skin. | Fins and no Hair. | Feathers. | Four Feet and no Hair. | Scales without Feet or Fins. | Scales with Fins. | Antennæ. | Neither Feet nor Scales. | | | |

Preliminary observations.

Preliminary observations.

Preliminary observations.

It is plain from this table, and from what we have mentioned concerning Haller, that it would be unjust to anatomists and naturalists to say they have never paid any attention to the physiological modes of arrangements. It can only be said that they have not paid to them all that attention which they deserve; and that no general physiological system of arrangement, excepting D'Azyr's, has, so far as we know, been yet attempted.

40
Whence materials might be collected for a physiological arrangement.

How such an arrangement ought to be made is easily described, though by no means very easily executed. It needs not a proof that functions should form its primary divisions; that its subdivisions should be the varieties of these functions; that the whole should be both distinguished and explained by the kinds and varieties of those organs, by which they are performed; that the descriptions of these organs might partly be collected from the several works of natural historians and comparative anatomists, as from the dissections of the French academy, from numerous fragments of the *Curieux de la Nature*, from the collections of Blasius and Vallentini, from the writings of Haller, from the works of the celebrated Hunters and Monros, from the publications of Hewson and Cruikshank, and those who have lately been making discoveries in the system

of absorbents. D'Azyr has mentioned a great many more. He particularly recommends Perrault, Du Verney, Collins, and D'Autenton, on Birds and Quadrupeds; Charas, Roestel, and Fontana, on Reptiles; Ray and Willoughby, Artedi, the Gouans, and Broussonet, on Fishes; Swammerdam, Malpighi, and Reaumur, the Geoffroys, Bonnet, and Lyonnet, on Insects; and, lastly, the curious researches of Willis, Ellis, and Donati; of Trembley, Baker, Baster, and Boadisch; of Forkal, of Adanson, of Muller, Pallas, Spalanzani, and Diquemare, concerning Worms, Zoophytes, and Polypes. Where any errors are to be corrected, or where any deficiencies are to be supplied, it is needless for us to observe that recourse must be had to new examinations and to new dissections, where it may be of some use to attend to the foods of animals, to their places of abode, and their modes of life, as circumstances leading to some internal varieties of structure. To the list of authors we might have added Camper on Fishes; and we should not forget the excellent writings of D'Azyr himself, whose table of physiological arrangement is a work of merit that bespeaks reflection, ingenuity, and labour, and which follows here, with only a small variation in form.

41
D'Azyr's arrangement.

A TABLE of the FUNCTIONS or PROPERTIES of LIVING BODIES.

- | | | |
|-----------------|------------------|------------------|
| 1. DIGESTION. | 4. RESPIRATION. | 7. GENERATION. |
| 2. NUTRITION. | 5. SECRETION. | 8. IRRITABILITY. |
| 3. CIRCULATION. | 6. OSSIFICATION. | 9. SENSIBILITY. |

Every body in which one or more of these functions are observed is to be considered as possessing organization and life.

| | | | | |
|-----------------|---------------|--------------------------------------|---|--|
| 1
DIGESTION. | Living Bodies | Which have | <p>One or more stomachs, easily distinguishable from the œsophagus and intestinal canal,</p> <p>A stomach distinguishable only by certain expansions from the œsophagus and intestinal canal,</p> <p>An alimentary canal, not distinguishable into œsophagus, stomach, and intestines,</p> <p>Neither stomach nor intestines,</p> | <p>{ Man.</p> <p>{ Quadrupeds.</p> <p>{ Cecaceous animals.</p> <p>{ Birds.</p> <p>{ Crustaceous animals.</p> <p>{ Oviparous quadrupeds.</p> <p>{ Serpents.</p> <p>{ Cartilaginous fishes.</p> <p>{ Fishes properly so called.</p> <p>{ Insects.</p> <p>{ Worms.</p> <p>{ Zoophytes.</p> <p>{ Plants.</p> |
| 2
NUTRITION. | Living Bodies | Whose nutritious juices are absorbed | <p>By vessels beginning from internal cavities,</p> <p>By vessels opening upon the external surface,</p> | <p>{ Man.</p> <p>{ Quadrupeds.</p> <p>{ Cetaceous animals.</p> <p>{ Birds.</p> <p>{ Oviparous quadrupeds.</p> <p>{ Serpents.</p> <p>{ Cartilaginous fishes.</p> <p>{ Fishes properly so called.</p> <p>{ Insects.</p> <p>{ Crustaceous animals.</p> <p>{ Worms.</p> <p>{ Plants.</p> |

3
CIRCULATION.

Living Bodies

With blood

- Having a heart with two ventricles and two auricles,
- With one ventricle divided into several cavities and two auricles,
- With one ventricle and one auricle,

- Man.
- Quadrupeds.
- Cetaceous animals.
- Birds.
- Oviparous quadrupeds.
- Serpents.
- Cartilaginous fishes.
- Fishes properly so called.

With a whitish fluid

- Whose heart is formed of one longitudinal vessel, tuberos and contractile, in which there is a whitish fluid instead of blood,

- Crustaceous animals.
- Insects.
- Worms.
- In some crustaceous animals there is observed something resembling a heart.

With juices

- In which no heart has been yet observed, but only vessels filled with juices of a nature different from that of blood,

- Zoophytes.
- Plants.

4
RESPIRATION.

Living Bodies

Which respire

- By lungs free from all adhesion, and spongy,
- By lungs free from all adhesion, vesicular, and muscular,
- By lungs adhering to the ribs, and provided with appendages,
- By gills of different forms,
- By stigmata or holes in different rings,
- By an opening called trachea, or by external fringes,
- By tracheæ,
- In which there have been discovered neither stigmata nor tracheæ,

- Man.
- Quadrupeds.
- Cetaceous animals.
- Oviparous quadrupeds.
- Serpents.
- Birds.
- Cartilaginous fishes.
- Fishes properly so called.
- Crustaceous animals.
- Insects.
- Earth worms.
- Aquatic worms.
- Plants.
- Polypes.

5
SECRETION.

Living Bodies

- There are no bodies in which secretions are not carried on.

6
OSSIFICATION.

Living Bodies

Whole skeleton is

- Internal and osseous,
- Internal and cartilaginous,
- External and corneous,
- External and cretaceous,
- External and ligneous,
- Which have no skeleton,

- Man.
- Quadrupeds.
- Cetaceous animals.
- Birds.
- Oviparous quadrupeds.
- Serpents.
- Fishes properly so called.
- Cartilaginous fishes.
- Perfect insects.
- Lithophytes.
- Crustaceous animals.
- Shell-fish.
- Madrepores.
- The greatest part of Zoophytes.
- Plants.
- Insects in their first state.
- Worms.
- Polypes.

Preliminary observations.

Preliminary observations.

7 GENERATION.

| | | |
|---------------|-----------|--|
| Living Bodies | Which are | Viviparous, |
| | | Oviparous, whether the evolution of the eggs takes place within or without the female, |
| | | Which propagate by slips, |

- Man.
- Quadrupeds.
- Cetaceous animals.
- Birds.
- Oviparous quadrupeds.
- Serpents.
- Cartilaginous fishes.
- Fishes properly so called.
- Insects.
- Crustaceous animals.
- Worms.
- Plants.
- Worms.
- Polypes.
- Plants.

8 IRRITABILITY.

| | | |
|---------------|------------|--|
| Living Bodies | Which have | A body muscular or contractile, |
| | | Muscles covering the skeleton, |
| | | A skeleton covering the muscles,
No muscular power; no spontaneous movements, |

- Greatest part of insects in the first state of their transformation.
- Worms.
- Polypes.
- Man.
- Quadrupeds.
- Cetaceous animals.
- Birds.
- Oviparous quadrupeds.
- Serpents.
- Cartilaginous fishes.
- Fishes properly so called.
- Perfect insects.
- Crustaceous animals.
- Plants.

9 SENSIBILITY.

| | | |
|---------------|------------|--|
| Living Bodies | Which have | Nerves and brain easily distinguishable from the spinal marrow, |
| | | Nerves and brain scarcely distinguishable from the spinal marrow, |
| | | In which there have not yet been discovered nerves or brain, or spinal marrow, |

- Man.
- Quadrupeds.
- Cetaceous animals.
- Birds.
- Oviparous quadrupeds.
- Serpents.
- Cartilaginous fishes.
- Fishes properly so called.
- Insects.
- Crustaceous animals.
- Worms.
- Zoophytes.
- Plants.

The above table, which has its divisions marked by the functions, and their kinds and varieties by the kinds and varieties of those organs by which they are performed, differs considerably from a zoological. Borrowing its several marks of distinction from internal characters, it more clearly demonstrates the difference between the mineral, vegetable, and animal, than any system that attempts to arrange by outward appearances.

No minerals, whatever be their forms or the regularity and beauty of their figures, were ever said to possess any thing like organs of nutrition; and however frequently some may recover their lost shapes, they are never supposed either to produce, or assist in producing, their own kind by generative powers. And no plants, however much may be said of animals that want a nervous system and a heart, and are

fixed, without the power of locomotion, to one place; we say no plants, though some may represent a few of the simpler effects of sensation, and others may be free to float through the ocean, were ever said to discover any signs of voracity, to possess any thing resembling a stomach, to distend their body by swallowing their food, to apply their food to the mouths of absorbents opening internally; and when the nutritious juices were extracted, to eject it in *cumulo*. It has been said that zoophytes present similar phenomena. But what are zoophytes? One half of their name would imply that they are animals, and another half would insinuate that they are plants. D'Aubenton reasons with clearness on this subject. True, says he, the greatest part of them are branched like plants, and like plants are composed of concentric circles. Some have a soft exterior substance which is called bark, and a hard interior

42
Difference between mineral, vegetable, and animal.

which

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observations.

which is called wood. Along their branches, and at their extremities, they put forth vesicles which resemble buds; and when a part falls from the whole, it is sufficient, like a vegetable slip, to produce a zoophyte: but do these appearances prove that they are plants?

If ramifications constitute a plant, then many crystallizations will be plants; the shootings of frost on our windows will be plants; the silver tree of Diana a plant; our veins will be plants, our arteries plants; and our very feet which ramify into toes, and our hands into fingers, will have some title to be called plants. The truth is, ramification is not universal in the vegetable kingdom; and although it be general, it is no more peculiar to plants, than swimming is to fishes or flying to birds. If concentric circles constitute a plant, some bones of animals will then be plants, and some minerals must also be plants. The wood and the bark are only two metaphorical expressions, which with equal propriety might have been used of the bone and periosteum. But once suppose the zoophyte a plant, it was natural to carry on the analogy, and certainly necessary to have it provided with wood and bark; though it must be allowed that a corneous substance is not what we commonly mean by bark, nor an evidently hard calcareous substance what we mean by wood. The small vesicles, except in appearance, have no similarity to buds or fruits: they are the residences of small polypes, to whom the whole structure has been owing, by whom the whole either is now or has been inhabited, and to whom it answers the same purpose as the shell does to testaceous animals.

43
Difference
between living
bodies and
machines.

After thus endeavouring to point out the boundaries between the mineral, the plant, and the animal (A), before we begin to treat of the functions, we must take notice of another distinction; the want of which has occasioned much unnecessary trouble, and has given rise to not a few ridiculous disputes. This is the distinction between living bodies and some ingenious contrivances of art, which are called machines. It has not been asserted that any machine can either grow or propagate its kind; that it can assimilate the particles of matter that come in contact; that it is able to repair the injuries which it may suffer; that it can accommodate itself to circumstances, can create heat when the cold is keen, or cold when the heat becomes too violent: yet it has been supposed, from established prejudices, and from the successive evolution of parts in plants and in animals, that there is an analogy between a machine and a living body. The living body has been called a machine; and notwithstanding the acknowledged truth of that observation so often repeated since the days of Hippocrates, That the whole is a circle, that nothing is first and nothing last in the

animal economy, we are still talking as if living bodies were nought but machines; we are still reasoning as if their parts had existed in succession, had acted in succession, were combined in succession; we are still seeking for what is prior and what is posterior, for what is derived and what is original in point of structure, as if we were examining a work of art; we speak gravely of the viscera, of the thorax deriving a coat from the membranous pleura, the abdominal viscera from the peritoneum, and the branches of nerves deriving a pair from the dura and pia mater of the head; we argue with people who maintain that fasciæ are nervous expansions, and the muscles themselves but nervous productions: and although we be hardly able to conceive how the brain could be nourished without blood thrown from the heart, or the heart move without the assistance of nerves from the brain, we are still disputing about which was prior and which was posterior in point of existence; a dispute that will probably terminate as soon as that of the ancients, whether the first eggs were from birds, or the first birds were hatched out of eggs.

44
The vital
organs
seemingly
coeval in
point of ex-
istence.

These dark and inscrutable mysteries of nature we presume not to explain: they point out almost the creative hand, and bring us almost into the immediate presence of that Being by whom we live, move, and exist; and before whom the truly feeling and elevated mind is less disposed to examine than adore. We are only to observe, that from this coeval formation of parts which the microscopic part of anatomy has often distinguished from their evolutions, and from this mutual dependence of organs one on another, we are left at freedom to begin at any part of the circle, and treat of the general properties and functions of living bodies.

45
Functions
form a circle.

We now venture on a rude sketch of the order and manner in which these properties may be explained, and in which the facts in general physiology may be afterwards arranged. Another opportunity may produce something more full and correct. In the present sketch, many imperfections will no doubt be found; we already are able to foresee many from our own inability to treat the subject according to its merit. And perhaps the reader, who is possessed of temper and candour, will impute some to the newness of the plan, and the present infant state of the science.

Without blaming the arrangement of d'Azyr, whose genius and labours we shall always respect, we have been induced to adopt the following, from those reasons with which the reader is now to be acquainted.

Attending minutely to a living body, which already has escaped from the seed, the egg, or membranes of the parent, which is wholly disengaged from the placenta,

(A) It is curious to observe how careless we are in annexing precise ideas to our words. Bonnet supposes that in some world more perfect than ours, the rocks may be organized, plants may feel, brutes may reason, and men may be angels. In this passage the form was all that seems to have entered into his idea of the man and the brute; and so new was his notion of a perfect world, that one who believed in the metempsychosis, would naturally imagine that he here had been fancying a state for the damned, where angry Heaven was to fetter the angel in the form of a man, a man in that of a brute, a brute in that of a vegetable, and a vegetable in that of an uncouth rock. How much to be pitied would the creatures be that reasoned and felt, and were at the same time more incapable of moving than an oyster or a limpet!

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46
The arrangement of functions in this article.

placenta, and depends for the future on the operations of its own organs (a), we may observe, that in order to live, it must be allowed the free use of air, as applied by the organs of—*Respiration*.

That, in order to grow, it must have likewise a supply of food, which is a substance somehow adapted to its constitution; and which, on being received into the system, is

Prepared by—*Digestion*,

Taken up by—*Absorption*,

Distributed by—*Circulation*,

Assimilated by—*Nutrition*,

And the whole carried on by means of—*Secretion*.

We next may observe, that in order to enjoy the free exercise of these functions, it must be secured from the more common and external injuries of its situation; and that this is done by certain integuments originally produced, and when it is necessary, afterwards renewed by that function; which, till we receive a new nomenclature, we shall venture to call by what may be rather an uncouth word—*Integumentation*,

We again may perceive, that these functions are all dependant on a general principle—*Irritability*;

By which the system is rendered by stimulants susceptible of—*Motion*;

Accommodates itself to different circumstances by means of—*Adaptation*;

Alters its shape by successive—*Transformation*;

Produces the species by—*Generation*;

And when the business of life is finished, is, after many a languid affection from the influence of—*Sleep*,

At last subjected to the general fate of all living bodies—*Death*.

These we imagine are the general properties of living bodies; and such is the order in which we are now to take a short and cursory view of them.

SECT. I. *Respiration*

Is that function by which air is brought into

the system, and by which it is prepared in particular organs, that in some respect succeed the placenta in the general economy. For as any interruption of the usual intercourse between the placenta and fetus in a ⁴⁷ *Respiration* *operation* *defined* *o*vo proves soon fatal, so when that communication naturally ceases, and the new one succeeds between the lungs and external air, it is likewise found, that any preternatural interruption of this last is in all living bodies presently attended with various symptoms of increasing languor, and in many with an almost instantaneous death.

So essential is respiration to the system, that snails, ⁴⁸ *Respiration* *operation* *defined* *o* chameleons, and some other animals, can live for years ⁴⁹ *Respiration* *operation* *defined* *o* upon air alone. We have seen a chameleon that lived ⁵⁰ *Respiration* *operation* *defined* *o* and was vigorous for twenty two months without any food, and which might have continued to live much longer but for an unfortunate bruise by a fall.

Other phenomena equally demonstrate the importance of air to the living body. The frog leaps away wanting its heart; it survives the loss of the greatest part of its spinal marrow. Without its head, it lives for some days, and its heart continues to circulate its blood (c). Spallanzani took one from the back of a female, cut off his head, and after performing this whimsical experiment, saw the gallant return to his mistress, grasp her in his arms, and finish the tale which he had begun: And Borelli found, that eels and serpents, though their bodies be opened, and the whole of their viscera be taken out, are able to move for a day after; and yet notwithstanding, in all these animals, the life is observed to be suddenly extinguished when the all-vivifying air is excluded. Even the smallest insect has died, and the plant lost its vegetative power, when retained for any while in a vacuum. The fish itself, when placed under the exhausted receiver, has started anxiously to the surface of the water in quest of fresh air; and finding none, has sunk to the bottom and expired in convulsions.

11

(a) To give a general view of the manner in which living bodies are nourished and supported in the egg and uterus, and before they begin to depend entirely on their own organs, we have subjoined a plate (see Plate CCCXCI.), representing embryos of various kinds. The three first figures are from Swammerdam: the first is the membrane containing the insect, the second the membrane after the escape of the insect, the third is the insect itself, fed by absorbents, opening on different parts of the body.

The fourth, fifth, and sixth figures, are from Grew: the fourth is a bean, spreading its seminal roots into the lobes. In the fifth and sixth the lobes of the seed are seen converted into seminal leaves.

The seventh to the twelfth represent the transformations of the chick in ovo: the first of these figures is from Aquapendens; the rest are from Blaius, who got them from Malpighi.

The remaining figures are all from Aquapendens: the two last represent a fish that is sometimes oviparous and sometimes viviparous.

Plants and animals are here observed spreading their roots in a similar manner. The proper proportions are overlooked, not being necessary to convey the idea which is here intended.

(c) "Two days (says Dr Monro) after cutting off the head of a frog at its joining with the first vertebra, I found it sitting with its legs drawn up in their usual posture; and when its toes were hurt, it jumped with very considerable force. Its heart likewise continued to beat about forty times in a minute, and to strongly as to empty itself and circulate the blood.

"In several frogs, after cutting off the back part of the six undermost true vertebrae, I took out all that part of the spinal marrow with the cauda equina which they cover. The lower extremities were rendered insensible to common injuries, and lay motionless: yet the frogs lived several months thereafter, and the wounded parts of their backs cicatrized, and the bones of their legs which I fractured were reunited, the blood circulating freely in their vessels." *Experiments on the Nervous System*, made chiefly with the view of determining the nature and effects of animal electricity.

Respira-
tion.

If objections should be made to these trials performed in a vacuum, if it should be said that under the receiver the shrivelled fruit swells and turns plump, that the body of the frog is strangely inflated, that its turgid eyes grow prominent in its head, and that thin phials corked full of air are broke by its expansion; still there are facts which do not admit of the like equivocal interpretation. All living bodies will die in the air which they have respired; and when ice covers the whole of the water, many of the fishes are known to perish; or if an opening be made in the ice, to hasten to the air, and rather than retire, quietly suffer themselves to be caught.

491
Seeming
exceptions

To this general dependance of life upon respiration, there occur but few things like an exception: these are some serpents and worms and crustaceous animals found alive in the hearts of stones, some insects that were found in wood, and a number of toads which in different places have been taken from the hearts of trees and of rocks, where they left an impression, and where they were supposed in some cases to have lived for centuries without air. These facts, real or pretended, have been the cause of much speculation. Some philosophers, who imagine that nature is always obliged to act agreeably to those ideas which they have already formed of her laws, are, notwithstanding the high authorities by which some of these facts are attested, disposed to doubt them. General analogy, which regularly opposes singular phenomena, is upon their side; and without her concurrence, they will grant existence to no living body that will not submit to the old established modes of respiration. Others again, who would not presume to dictate for nature, who have long experienced that she is not forward to obtrude her secrets, and who can believe that she may have still some to communicate, consider these facts as something new which she means to impart; and as one of the instances where she seems to deviate from general analogy in adhering to her grand accommodating principle by which she fits every living body for a certain range of varying circumstances.

50
Animals in-
closed in
stones, &c.51
Opinions on
this subject

These last, receiving the facts as sufficiently authenticated, have studied only how to account for them. When stones therefore were thought coeval with the world itself, they supposed their toads to have sprung from the ova that were scattered through the earth at its first formation; they did not recollect, that if the earth must have existed before these ova could have been sown, and that if the stones were coeval with the earth, the ova could not have entered their substance. When they afterwards learned that the consolidation of stones is an operation still carried on in the mineral kingdom, they acknowledged their ova to be less ancient, but did not perceive that all these ova involved suppositions that cannot be admitted by sound reason. For how was an ovum to grow without air and without food? and how particularly was it to grow with such a force as to make an impression in a solid rock? This would imply a power of expansion scarcely to be equalled by gun-powder, and which we ought not to be rash in ascribing to the nutritive effects of abstinence and nothing. Were it not for the toad, the expansion itself might have found a solution in a theory of the Earth, which has cast all its stones in a foundery under

the water, where the moisture might have rendered them apt to be formed with numerous cavities.

Respira-
tion.

Perhaps the way to remove these difficulties concerning the toad, would be to ascertain its mode of existence in the heart of the stone. Suspecting that the air communicated somehow with the solitary cell, we procured a toad that was crawling out from its den in the evening. It was put into a glass just large enough to hold it with ease. The mouth of the glass was filled with cork sufficiently close to retain water; the glass was then laid on its side, and the animal respired for several days without discovering signs of uneasiness: but supposing that air might still be admitted, the cork received a covering of wax, and the animal died ten hours after.

From this experiment, and the fate of toads when put under an exhausted receiver, from an air passage in the crust of chrysalids, from the porous texture of the white speck, or the opening which the snail leaves in the membrane that is spread over the mouth of its shell, we were led to think on d'Aubenton's remark, that the inclosed toads might have breathed, and that the wood has been always cleft, and the stone broken, before it was shown how the external air was excluded †.

On farther reflection, our own experiment appeared inconclusive; and d'Aubenton's remark, after close examination, seemed not entitled to much attention. He would have it supposed that a toad is lurking in every block of stone and of wood; and on this supposition would have an inquiry to be regularly made, whether or not there be any communication between this supposed animal and air; because, when the stone or wood is in fragments, the attempt to disprove such communication is in his opinion impossible.

† Encyclopæ-
die Méthodique, tom.
2. partie 2.
p. 610.

But are we certain that the admission of external air would remove the difficulty? We are not so positive now as we were upon this subject. In the summer months, we recollect to have drowned frogs which were living in the fields, by keeping them some hours under water: but if we allowed them to rise to the surface, and respire at pleasure, they became at last so accustomed to that element, that if the temperature was not much above that of spring-water, they lay in the bottom not only for days but for weeks together.

In the winter season, it is well known that frogs are sometimes discovered in clusters below stones and under water in the neighbourhood of springs; and often seen in the bottom of ponds, marshes, and ditches, where water is collected, and the whole surface covered with ice. In this situation, we have frequently examined their sides and their nostrils, and can venture to assert, that they did not respire in the same manner that they did when on land: for the moment that this animal is put under water, the palpitating motions of its sides and its nostrils are observed to cease; and Chaptal has seen them suspending respiration as it were at pleasure even when in air ‡.

While they move, however, and exhibit indications of active life, we would not say that air is excluded. In the roots of plants, in aquatic worms, in polypes, and in the placenta itself, the same organs seem to perform the double office of lungs and absorbents. When

under

Respiration.

52
Some things relating to frogs and toads.

under water, what are the functions of these organs in frogs and in toads? It is not disputed that in moist places they can live longest without food; and some phenomena which have been observed relating to this subject appeared to us not unworthy of attention. In the beginning of the summer 1793, while we were making a few experiments on the nervous influence with some metals, a frog was taken out of the water in the dusk of the evening, and put into a deep and wide-mouthed glass till next morning: but next morning a quantity of water was found in the glass, the animal was dead, its mouth full of foam, and the greater part of its body covered with froth. The following autumn a boy came with a couple of toads wrapt up in tow. Till we had leisure to make our experiments, they were allowed to remain as they were for three days in the corner of a room. When taken out, their colour was pale, their bodies much swelled, and a quantity of water collected between the skin and the muscles. When held in the hand with their head upwards, the water was evacuated downwards by the anus. It was one of these toads that afterwards died when confined in the glass without air. Its body was put into a solution of madder for two days; and when the skin and muscles were removed, the bones, which are still preserved, were found red. A live frog in the same solution, though allowed to breathe, expired in a few hours. In three days its bones became of the red colour, but not so deep as that of the toad's. Another frog died in the solution; but the bones, from age or some other cause, did not receive the colour of the madder. In all cases the skins were found red.

As we know not how far the great accommodating principle of nature may be extended, perhaps the absorbents opening externally may in these animals sometimes supply the place of the lungs, as the lungs supplied the place of the gills which they used when tadpoles, and as the gills had formerly supplied the place of a placenta, or the primary absorbents, through which they derived their nourishment in ovo.

Those stones which inclose animals are known to be such as have gradually assumed the solid form, and those animals which have been inclosed are known to be such as in other cases have been subjected to the torpid state: But this state has not been examined with all the attention which it deserves. From this state, Bonnaterra says, in his introduction to Ereptology*, that it is impossible to rouse the animal by the loudest noise, the rudest shock, or the deepest wound; the internal motion is just sufficient to preserve the system from that decomposition to which animal substances are exposed. It retains only the form of what it was. It appears neither to live nor to grow; and the whole mass, if what is exposed to the air be excepted, is not sensibly altered while the torpor continues. All the senses are shut up; all their functions are entirely suspended: digestion is no longer in the stomach; all respiration has apparently ceased; and it has been doubted whether or not this function be in some cases at all retained. When the genial warmth, however, returns, in six, in

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eight, or in ten months, according to that variety of climates between the frigid poles and the tropics, the animal revives. But the question is, if the first circumstances in which the animal became torpid had been artificially or naturally continued, how long in this way might the different functions of life have been suspended; and how far are we warranted by the analogy of seeds and of eggs to lengthen this period of their existence, without supposing a decomposition or destruction of organs?

Experiments must tell what are the limits which nature has here prescribed to herself. New eggs, when covered with varnish, or placed under the exhausted receiver, are secured against the attacks of corruption. Bomare, in his Dictionary, has mentioned three, which, protected from air, were found fresh in the wall of a church after a period of 300 years (b).—And if it be true that a snake found in a block of marble died as soon as exposed to the air, or if the parts in contact with air be the only ones which in torpid animals appear to be changed, it would seem probable that a total exclusion of this varying and active element would tend more to the preservation of torpid animals, in certain instances, than a free admission, which, in those cases where all vital functions have ceased, is regularly found a principal agent in their dissolution.

M. Herissant of the French Academy was the first philosopher who, by means of experiment, thought of interrogating nature herself upon this subject. On the 21st of February 1771, he with great accuracy shut up three toads from the air, two of which were taken out alive on the 8th of April 1774. D'Aubenton says†, after a period of 18 months; but in this instance we depend more on the friend ‡ of Fontana, who has mentioned the dates. The two toads were again inclosed, and Herissant died before there was a second inspection. D'Aubenton says, that when taken out their bodies were hard and shrivelled, and their whole structure totally absorbed. A fourth toad that had been inclosed was heard to croak whenever the box in which it was confined happened to be shaken. Since that period the practice is common of confining snails in a sealed phial, where they exist in torpor for years.

These phenomena still excite wonder, but to wonder less, and examine more, would sooner procure us that information which we are wanting. In these observations concerning toads, have no circumstances been overlooked? Has it been determined whether they lived in the heart of stones, or, existing merely in a torpid state, had come alive when exposed to air? We have seen a toad that was dead for two days; its body was opened; its heart was seen motionless, but exposed to air in a few seconds it began to beat.—Considering the complex function of absorbent, we perhaps might conceive how a toad could live in the clefts of rocks, or the hearts of trees, where there is moisture; but has it yet been determined whether all stones in which toads have been found supplied them with moisture? We at least are certain that they do not

4 R

Respiration.

55
Eggs and seeds preserved long when air is excluded.

56
Herissant's experiments respecting the toad.
Encycl. Method. Hist. Nat. tom. 2. Ovipares. Dict. de Merveilles de la Nat. Animaux Vivans Rentrerment

(b) See Bomare, under the article Œuf; and a fuller account of the same eggs in the *Dictionnaire de Merveilles de la Nature*, under Œuf.

53
Different functions of their absorbents.

54
What sorts of stones inclose animals, and what sort of animals are inclosed.

*Encyclopédie Méthodique.

Respira-
tion.Respira-
tion.

absorb the animal fluids, like the plaster used by the French academicians.

One of the toads was heard to croak after being inclosed. In making their experiments, has it, therefore, been thought a matter of indifference by the French philosophers, whether the animal was immured alive in the full exercise of all its functions, or existing only in its torpid state? and with respect to this singular state, (might not the questions be fairly put), have its several kinds, have the causes which induce it, or those degrees to which it may be carried in different animals, been yet ascertained? Is not our knowledge of the torpid state at this moment principally the result of casual observation? Has it not been oftener than once supposed that the torpor of all animals is similar, or takes place to a similar degree? Have not torpid animals been therefore spoken of in general terms? and has it not been asserted that they retain a portion of heat and internal motion? though some have been found congealed in the ice, and many been dried to such a degree that they could be revived only by moisture.

“That snakes and fishes, after being frozen, have still retained so much of life as when thawed to resume their vital functions, is a fact,” says Mr Hunter, “so well attested, that we are bound to believe it.” How came it, we would ask, that fishes which had been frozen by this truly ingenious physiologist never recovered? He recovered parts of different animals which had been frozen? Had the snakes and fishes of which he had heard been only partially congealed in the ice? or had the fishes which he selected for these experiments been properly chosen? or may all animals with equal fairness be made the subject of such experiments? and may all transitions from heat to cold, and from cold to heat, whether slow or rapid, if not in the extremes, be viewed as nearly of the same consequence? Are all seasons and conditions of body equally favourable to this state of torpor? and will these causes which induce torpor by operating externally in the months of autumn be able to continue it by the like action in the months of spring? We can answer, no.

It has been said that animals subsist in their torpid state by the reabsorption of fat. Has it therefore been proved that all animals, not to say living bodies, are possessed of fat? or if they be, has it been demonstrated that they have a superfluous quantity to be reabsorbed? Has it been shown that their waste of fat is always occasioned by this reabsorption; or has this reabsorption in all cases been of that kind to counteract the effects of abstinence? If it has not been proved that all animals contain fat, and that this fat is reabsorbed in their torpid state, ought not the general assertion to be limited? Granting that in many respects it were true, have not philosophers been here amusing themselves with logic, where they could have been employed in making experiments? Have they not ventured to give us conclusions, where we had reason to expect facts? and on this account has not their conduct been somewhat similar to that of navigators who, sailing along the coast of Patagonia on one side, and observing

a few men of an uncommon stature, have from thence peopled the whole of the country with a race of giants? or rather to that of some calculators, who, from seeing a few parts of a continent, have ventured to give a map of the whole, to describe kingdoms that are yet unexplored; and by their skill in addition and subtraction to exhibit the figure, the extent, and proportion of lands unknown?

Leaving therefore the torpid state as one of those subjects with which we at present are little acquainted, and of which we therefore cannot speak with certainty in the general abstract language of science; it will naturally be asked, In what respect is air so necessary to all living bodies in their active state, and how it contributes to the regular performance of the different functions?

The ancients, who were led by the heat of the blood to suppose a vital spark in the heart, who had noticed the appearance of smoke in the breath, and who had observed that fire was extinguished when deprived of air, naturally inferred that the end of respiration was to support their imaginary flame, to ventilate the blood in the arteries and lungs, and to keep alive their vivifying spark. They were far, however, from being agreed as to the manner how this was effected. Some were of opinion that a certain principle of the air was absorbed, to which they gave the name of *the proven-der of life* †, or the food of the spirit ‡; while others were persuaded that the air acted as a refrigeratory, and was merely intended to moderate the fire, to assist in expelling the fuliginous vapour, and preserve the system in an equal temperature.

The moderns, who, after all their researches, have been unable to discover this vital spark of the ancients, are more puzzled to assign an adequate cause for the heat than for any cold which they discover. To account for this singular phenomenon, they have been ransacking nature for causes; and perceiving that putrescence, mixture, and friction, are in many instances accompanied with heat, have thence conjectured that they sometimes operate in producing the warmth of the living body. But these are theories which have been imported from the hot-bed, the laboratory, and mechanic's shop, and which have never yet been countenanced by physiological facts and observations. No one has been able to show that putrescence exists in a healthy state, except in the feces: no one has proved that any mixture which regularly occurs in the elementary canal or vessels, generates heat; and though friction has been a favourite hypothesis, yet those circumstances, in which it evidently produces heat, have not been discovered in the living body; and it is not determined whether it be there a friction of the fluids, a friction of the solids, or a friction of the fluids and solids together.

Of animal heat, the most rational theory, we think, is one which properly belongs to the last century; it is confirmed by modern discoveries, and has ascribed this heat to respiration. Many had observed, that those animals which respire most have the warmest blood (E).

Lower

(E) Quod autem animalia calidiora fortius respirent, non probat respirationem illis potius datam esse, ad sanguinis refrigerium, quam calorem illum intensum produci a validiori respiratione: imo posterius non tantum æque, at magis probabile apparet: quia secundum omnium sententiam calido vivimus, frigido extinguimur.

57
Queries re-
specting
this kind of
experi-
ments.

59
Reabsorp-
tion of fat
in the tor-
pid state.

59
Opinions of
the ancients
respecting
the use of
respiration.

† Pabulum
vitæ.
‡ Spiritus
alimentum.

60
Opinion of
Veheyen,

Respira-
tion.

Lower demonstrated, that this blood received a new and a brighter colour in passing through the lungs (F). Verheyen and Borelli both proved, that the air lost something by coming in contact with that organ (G). Mayow showed, that this something which the air loses is contained in nitre (H). Experience taught the workers in nitre, that this something was absorbed from the air (I): and Verheyen remarked, that it is also absorbed by the lungs; and is probably that which maintains combustion; which qualifies the air for giving support to animal life, and imparts to the blood the vermilion colour (K).

61

Supported
by a discov-
ery of Dr
Priestley's.

How well the whole of this reasoning was founded, is proved by the late discoveries of Priestley and other chemists. There is now obtained, in a separate state, an aerial fluid, which maintains both life and combustion, and gives a vermilion colour to the blood. It is extracted in a very large quantity from nitre; is one of the component parts of the atmosphere, and the vital principle of that element; without which, in most animals, life is extinguished. From some phenomena which happen in combustion, it has been termed *principium foribile*. It was called dephlogisticated air by Priestley the first discoverer; as the great acidifying cause in nature, the French nomenclature has given it the name of *oxygenous gas*; and, as one of the causes on which the existence both of fire and of life depends, it is named *empyreal* or *vital air*.

62

Respiration
the cause of
animal
heat, and
how this
heat is pro-
duced.

Late discoveries have shown farther, how this air may in respiration produce heat. From the most accurate investigations, it appears, that caloric, or the principle of heat, is a distinct substance in nature; that it combines with different bodies in different degrees; that it is the cause of fluidity in all; and that, in proportion to that capacity which they have for it, and to that distance at which they are removed from the fluid state, the more or less caloric they con-

tain. Aeriform bodies being all therefore exceedingly fluid, it must be evident, that when they are fixed or condensed in the blood, and made to approach nearer solidity, a quantity of heat must be evolved. A part of this is very plainly evolved in the lungs where the air is absorbed, as appears by the breath; and a part evolved by the action of vessels, as appears from nearly an equal heat over the system, from the partial heat of a morbid part, and the sudden transition from heat to cold, and from cold to heat, over the surface, when the vessels are affected by either internal or external stimuli. When the heat, thus evolved by the gradual fixation of that body with which it was combined, has been successful in making its escape by the lungs and integuments, the blood returns in a dark and a sluggish stream by the veins, and mingles again with the genital fluid, which before gave it spring, activity, and life.

Of that oxygen which remains in the system, part is employed in forming different saline combinations and supplying the waste occasioned by that constant reabsorption; which, from many experiments that have been made with solutions of matter, is known to take place in the solid bones. The use of that oxygenous gas which returns with the breath, is best understood after knowing its affinities. Its basis oxygen, combining with hydrogen, which is the basis of inflammable air, forms water; and combining with carbone, the carbonic acid. It carries, therefore, back with the breath a part of the carbone produced by the slight combustion of the blood, and a quantity of hydrogen arising from the watery fluid decomposed.

But oxygenous gas does not alone enter the lungs. Of 100 parts of the atmosphere, but 28 are oxygenous gas, 78 is carbonic acid, and 72 are azotic gas (L). These last, though intended chiefly for other beings different from man, which are in immense numbers on the globe, but which, like him and the nobler animals are not formed

63

Of which comp se the
atmos here
which we
breathe,
and their
use in respi-
ration.

4 R 2

Ut proinde non vileatur aliquid a natura datum esse, quo intenditur frigus vitæ contrarium. Verheyen, Tract. 2 cap 7. de Usu Respirationis.

(F) Postquam circulatio sanguinis innotuit, diu creditum fuit sanguinem venosum colore illo coccineo rursus indui in ventriculis cordis, et præcipue ubi calor, quem judicabant istius coloris authorem, est intensior: At negotium istud peragi in pulmonibus, nempe respirationis beneficio, evidenter ostendit cl. Lowerus experimentis. *Ibid.*

(G) Inquiramus quale sit istud æreum adeo nobis et multis animalibus necessarium. Ut ejus defectu vita extinguatur citissime. Vulgaris enim aer dici non potest, cum illum per meatus notabiliores sanguini immitti conveniret, sitque experientia certissimum, animalia respirantia non tantum ære simpliciter; sed etiam recenti continuo indigere, unde concludendum est tantummodo aliquas particulas subtiliores ab ære secerni, et massæ sanguinis immisceri, quibus spoliatus ad ulteriorem respirationem sit idoneus.

(H) Et quidem verisimile est, inquit Mayow, partibus quibusdam indolis nitrosaliniæ, easque valde subtiles, agiles, summeque fermentativas ab ære pulmonum ministerio secerni, inque cruoris massam transmitti. Aëre enim ad vitam quancunque sal istuc æreum necessarium est, ut ne plantæ quidem, in terra, ad quam aeris accessus precluditur vegetari possint; sin autem terra ista aëri exposita, sale hoc fecundante denuo impregnetur, ea demum plantis alendis iterum idonea evadet.

(I) In ære autem quid nitrosum contineri norunt ipsi vulgaris nitri confectores, qui terram aut laterum fragmenta ex quibus nitrum elixivare intendunt, aëri liberi aëri diu multumque exponunt; utque ab eo sem undique ea tangente ac persuente uberius impregnetur, sæpius vertunt, atque ita suorum sumptuum et laborum ampliorem mercedemque referunt.

(K) Insuper, si post coactionem nitri terra aut laterum fragmenta exponantur libero aëri, ea denuo post aliquod temporis spatium, quodam sale nitroso abundabunt. Est autem verisimile, aerem grati ejusdem materię et vitæ nostræ continuationi et ignis accensionis necessarium esse; præcipue cum rursus experientia doceat ruborem sanguinis e corporeeducti, per additionem salis nitri intensum iri in eodem prorsus modo secerni, per respirationem in corpore vivente. *Ibid.*

(L) These are nearly the proportions.

Respira-
tion.Respira-
tion.

ed to breathe the empyreal air, must notwithstanding be of some important and essential use to all living bodies. It has accordingly been found by experiment, that pure and unmixed oxygenous gas cannot be breathed for any very considerable time without danger; that some azote is contained in the blood, and has been extracted from the muscular fibre, when properly treated with the nitric acid. According to Berthollet, five of its parts with one of hydrogen forms ammonia or volatile alkali; which dispels the glandular tumours of the body, and prevents the coagulation of blood and the thickening of mucus which arise from acids (M). The azotic gas may therefore in part unite with hydrogen, may prevent the coagulation of serum, the catarrhus formation of viscid mucus, and many combinations that oxygen might form, injurious to the system. The carbonic acid, which is $\frac{2}{3}$ of carbone and $\frac{1}{3}$ of oxygen, may also be necessary in regulating the effects of the other two. In aerated water, its uses are very generally known: it allays the pain of the urinary bladder when excited by calculus; it has been employed in the cure of wounds, and been thought useful in the pulmonary phthisis. It is generated in the lungs of those animals which respire oxygen. In small proportions it favours the growth of the vegetable tribes. These tribes readily decompose it; and, with the addition of other prepared oxygen from water, restore what is pure to the general mass of the vital fluid, that plants and animals might thus live by the mutual performance of kind offices.

We return again to animal heat. Every theory that pretends to account for animal heat, ought also to account for that singular equality of heat which the system preserves, or endeavours to preserve, in different temperatures. The above theory explains it simply in the following manner.

64
How an
animal pre-
serves its
natural
warmth in
a cold tem-
perature.

Venous blood, if exposed to the air, is known to absorb a portion of oxygen, and assume that colour which it has in the pulmonary veins and aorta. Suppose an absorption of a similar kind taking place in the lungs, a fact which may be proved by decisive experiments; it is plain that the oxygen by this absorption must recede from its gaseous or fluid state; that a quantity of heat must be therefore evolved, which, along with the heat of the reflux blood, is carried away by that vapour which issues from the lungs. In the course of circulation, the oxygen will naturally incline with hydrogen to form water; it will tend likewise to the formation of many other compounds; and, as it enters into new states, and is farther removed from gaseous fluidity, it must still be giving out a portion of heat. If the surrounding temperature be cold, this separation will be easily effected. The caloric will, in that case, be greedily absorbed from the interior surface of the lungs and exterior surface of the whole body. The oxygen, meeting with the necessary temperature, will readily pass into new forms; and the venous blood returning to the lungs, will demand a supply which

will be either greater or less according as the cold, by favouring the escape of the caloric, and promoting new combinations with oxygen, had removed it from the point of usual saturation.

The gradual evolution of heat is a proof that the temperature must be sometimes reduced before the oxygen can properly enter into all the usual combinations of the system. Suppose the body then to be placed within a hot circumambient atmosphere. This atmosphere, if warmer than the animal, will be more apt to part with heat than to receive it; and the oxygen absorbed, being thus unable to dispose of its caloric, will be prevented from passing into those combinations and forms where heat is evolved. The venous blood will therefore conduct it back to the lungs, and make a demand for a new supply; but proportionally less according as the hot circumambient air, by preventing the escape of the caloric, and the usual facility of new combinations, has confined its removal to a smaller distance from the point of saturation.

In this last case the thing principally entitled to notice is a very curious effort of nature to resist the growing increase of heat. In the warm atmosphere, as during violent muscular exertion, the exhaling vapours are commonly discharged in a greater quantity from the surface of the body; and consequently the heat furnished with an excellent temporary conductor, that in some measure counteracts the dangerous effects from without.

After all, the reader is not to suppose that he here has received a general theory of respiration. All living bodies are not supported by the same kind of aerial food. Oxygenous gas has indeed been honoured with the flattering appellation of vital air; and nitrogenous gas been usually distinguished by that degrading epithet azotic; a word which signifies destructive life. But though man, and all the warm-blooded animals that have yet been examined, may die in respiring the nitrogenous gas, this gas however, which constitutes more than two thirds of the whole atmosphere, may in general be called the vital air of the vegetable tribes, and of not a few of the orders of insects which thrive and live in it. For while man, and others which respire as he does, emit both the hydrogen and carbone, and return the nitrogen not sensibly diminished; most vegetables and many insects eagerly inhale them, and emit oxygen as noxious or useless. These effects are the indications of a radical difference in constitution. Even the fibres of those living bodies which exhale oxygen, will, after death, attract it so powerfully, as to decompose the nitric acid; but those bodies which inhale nitrogen, have so very weak an affinity to oxygen, and so strong a one to some of the bodies with which it is combined, that they can easily decompose water and carbonated air.

What fishes respire is not ascertained. Neither the change of the air, nor of the water which they occasion when in close vessels, have, so far as we know, been fully examined. Chaptal is assured, that, like other animals, they are sensible of the action of all gases. Four-
croy

67
Ref, iration
of fishes,
and their
tempera-
ture.

(M) Weak volatile alkali dissolves mucus, whose morbid viscosity Fourcroy has ascribed to a too great absorption of oxygen.

Respiration.

Respiration.

68
Temperature of plants.

70
Certain degrees of heat natural to every species.

69
How the natural heat of living bodies is, to be estimated.

71
Regulated by respiration.

croy says, that they do not generate the carbonic acid; and that the air which Priestley and he found in the air vesicles of carp was nitrogeous gas. Their thermometrical heat is so low, that in D'Aubenton's table they are reckoned among the cold-blooded animals.

The temperature of plants is still lower. The heat of a tree which the very ingenious Hunter examined, though several degrees above that of the atmosphere when below the 50th division of Fahrenheit, was always several degrees below it when the weather was warm. When taken out, the sap was observed to freeze at 32°; while in the tree, it would not freeze below 47°. The very profuse perspiration of vegetables greatly moderates the heat in their surface; and as air which absorbs moisture expands, and becomes thereby specifically lighter, there is a regular current produced, and evaporation rapidly promoted by the dense air displacing the rarefied.

To adopt here a general language with respect to the heat which is developed in all living bodies, it is proportioned to the quantity of matter which is by means of the vital powers reduced to a state more nearly approaching solidity; to the kinds of the substances which are reduced, and to the degrees and kinds of the reduction.

In all living bodies there appear to be certain degrees of heat, peculiarly fitted for carrying on their

various economical operations. What these are, in the different kinds of plants and animals, is not known. The bear, the hedge hog, the dormouse, and the bat, may probably not digest when reduced to 75°, 75', or 80°. The frog, however, will digest at 60° (N); and the birch before it at arrives at 47° (O). It would seem that respiration, besides imparting aerial food, was intended to preserve and regulate these different degrees of heat. It raises the heat after a meal; it suffers it to fall in the time of sleep; it withdraws the supply when the atmosphere is warm, and increases it again when the atmosphere is cold. It should therefore be remembered, that heat merely is not the object which is solely aimed at in respiration. All living bodies have their congenial degrees of heat. The regulation of these is important: on the one side, it prevents the dissipation, on the other the coagulation, of their fluids; it preserves the living power of their organs; and, by a natural and proper temperature, assists their action in mixing, composing, in decomposing, and in variously preparing the different parts for secretion, excretion, absorption, reabsorption, and assimilation (v).

As various fixations of the vascular fluid are regularly taking place in the different parts of the living body, and as air is not the only fluid concerned, it should almost be unnecessary again to observe, that the whole of the heat is not evolved in the lungs, nor the whole that is evolved disengaged from air.

It

(N) See observations on certain parts of the animal economy by Mr Hunter. We allude here to his experiments and observations on animals, with respect to the power of producing heat.

(O) See Dr Walker's excellent Paper on the motion of the sap in trees, 11th volume *Philosophical Transactions*, Edinburgh.

(P) The ingenious Dr Crawford has published a theory of animal heat different from that which we have here presented to our readers. Assuming as a fact, that heat and phlogiston are two opposite principles in nature, he goes on as follows.

"Animal heat seems to depend upon a process similar to a chemical elective attraction. The air is received into the lungs containing a great quantity of absolute heat; the blood is returned from the extremities highly impregnated with phlogiston; the attraction of the air to that of the phlogiston is greater than that of the blood. This principle will therefore leave the blood to combine with the air: by the addition of the phlogiston, the air is obliged to deposit a part of its absolute heat; and, as the capacity of the blood is at the same moment increased by the separation of the phlogiston, it will instantly unite with that portion of heat which had been detached from the air.

"We learn from Dr Priestley's experiments with respect to respiration, that arterial blood has a strong attraction to phlogiston (become a vague word with different meanings in different authors). It will consequently, during the circulation, imbibe this principle from those parts which retain it with the least force, or from the putrescent parts of the system: and hence the venous blood, when it returns to the lungs, is found to be highly impregnated with phlogiston. By this impregnation its capacity for containing heat is diminished. In proportion, therefore, as the blood which had been dephlogisticated by the process of respiration becomes again combined with phlogiston in the course of circulation, it will gradually give out that heat which it had received in the lungs, and diffuse it over the whole system.

"To account for the stability of animal heat, he observes, that as animals are continually absorbing heat from the air, if there were not a quantity of heat carried off equal to that which is absorbed, there would be an accumulation of it in the animal body. The evaporation from the surface, and the cooling power of the air, are the great causes which prevent this accumulation: and these are alternately increased and diminished in such a manner as to produce an equal effect. When the cooling power of the air is diminished by the summer heats, the evaporation from the surface is increased: and when, on the contrary, the cooling power of the air is increased by the winter colds, the evaporation from the surface is proportionally diminished." See *Crawford on Animal Heat*, p. 73—84.

Besides, supposing that the principles of fire and inflammability are opposites in nature; this theory supposes that the blood, while in the lungs, gives out phlogiston and takes in heat; but that, during the remaining course of circulation, it gives out heat and takes in phlogiston: it supposes, that this phlogiston is collected from parts that retain it with little force, or from the putrescent parts of the system; it is not said where it

is produced

Respira-
tion.

73
All the air
in a living
body does
not enter
by the
lungs, nor
is contained
in them.

*See *Offi-
cations on
Zanglion*,
by the late
Mr Hunter.

† *Borelli de
Motu Ani-
malium*,
cap. 23.
De Natura,
lib. i. cap. 209.
‡ *Chaptal's
Elements of
Chemistry*,
vol. i. § 5.
chap. 2.
[*Anatomical
Description of
the Democ-
rite*, by
the French
Academy.

74
Respiratory
organs.

It may farther be remarked, that the whole of the air does not enter by the lungs; much is contained in the liquid and solid parts of the food. It is extricated often in the process of digestion; and when the organs are vigorous and healthy, is made subservient to the general economy. If the organs, however, should happen to be languid, it scorns their authority, which cannot be enforced; from being friendly, it soon becomes inimical to the system, and threatening danger accumulates, not only in the stomach and intestines, but in other cavities. It has been found in the cellular membrane; in certain vesicles formed for itself; in the uterus; in an abscess; and in gun-shot wounds: It has sometimes burst from the vagina with a sort of noise*. And in a nephritic complaint of a horse, we have observed it flowing in a stream from what the farriers denominate the *sheath*.

In some kinds of aquatic plants, in eggs, and in a variety of fishes, there are certain vesicles containing air, which seem to have certain necessary functions allotted them by nature. In the plants and in fishes they were once supposed to have been wholly intended for swimming (Q). It was remarked, that those fishes which remain constantly at the bottom of the water have no air vesicle; and that a fish whose vesicle was burst by means of the torricellian vacuum, though it lived for a whole month after in a pond, was never able to rise to the surface†. The practice, however, which some fishes have of ascending at times to inhale air, and descending after their vesicle is filled‡; the communication which, in some fishes, this air vesicle has with the stomach; the power in the pigeon and some other birds of introducing air into the crop||; and lastly, the air which is uniformly found in impregnated eggs—would tempt us to believe that these natural collections of air, with their other uses, may perform some essential service in nutrition.

Having explained the general intention of respiration, we are now to inquire, what are the kinds of respiratory organs, and in what manner their functions are performed? The preceding table has in some measure made us acquainted with this subject. Some animals breathe by a trachea and lungs; insects, by either stigmata or tracheæ, opening into air vessels; plants,

by air vessels and leaves; fishes, and numbers of the watery element, if they do not breathe, at least receive air by their gills; the ætus in ovo, the polypus tribe, and many more organized bodies, by the same organs which convey their food.

The absorbents appear to be the first and most general way by which living bodies are supplied with air: the mouths of these vessels are like small tubercles, scattered over the body of the insect while wrapt in its membrane. In the horse and the bird they are blood-vessels spreading on a membrane, and deriving nourishment from the uterus or egg, that had been itself nourished by absorbents: In a cow, they are vessels which, spreading on a membrane, terminate in glands; these glands being opposite to others which adhere to the uterus; and the membranous and uterine glands, when in contact, inclosing a third gland like a kernel. In man, they are vessels spreading on a membrane, and entering a large glandular body called the *placenta*. In the mouse and the hare, they are likewise vessels branching on a membrane, and entering a placenta: this placenta, when it happens to be fixed, receives large veins from the parent, and which may be either inflated or injected from the cavity of the uterus.

Those which are properly respiratory organs, exercise not their function till circulation and nutrition are begun: though, if the observation of Garman be just, that the air may become a real food for the class of spiders, or if it be true that the larvæ of ants as well as of several insects of prey, increase in bulk, and undergo their metamorphoses without any other nourishment than air§, this law is not universal. It may, however, be doubted, whether some moisture be not absorbed. With regard to the ant, we have reason to suspect that the observations on which such a conclusion was founded have not been accurate.

Not only are the respiratory organs thus late in exercising their functions; in many vegetables a great part of them is annually renewed and laid aside in the torpid state. In those insects which undergo the most remarkable kinds of transformation they suffer a change; and in all those animals which spend their earlier days in the water, and afterwards come to live in the air, they are altered in kind.

In

supposes that the blood, in passing through the lungs, receives heat only: that the whole of this heat is evolved in the lungs by precipitation; and is thence diffused over the system as from a centre or focus: in which case, we must also suppose that the lungs are the warmest part of the body; and that the heat of the other parts will be in proportion to their distance from the lungs, or the length of the vessels through which it has passed.

As for the stability of animal heat, this theory ascribes it entirely to foreign causes; to the different degrees of evaporation; or to the varying states of the air.

The singular meaning which this theory gives to the word *phlogiston*, must strike every one who knows the etymology of that word. The celebrated Stahl found it in the Greek; and applied it naturally to signify pure elementary fire, or the most pure and simple inflammable principle in a state of combination. Mr Kirwan has since used it to express hydrogen: Dr Priestley has called the azotic phlogisticated air; and Dr Crawford, who seems to take phlogiston in the sense of Mr Kirwan, speaks likewise as if he understood it in the sense of Dr Priestley. Mr Kirwan's phlogisticated air however, will not kindle without oxygen: Dr Priestley's will extinguish fire: and Dr Crawford's is directly opposed to that principle. These are not the ancient doctrines of Stahl: they are new ideas expressed in one of his antiquated words; the meaning of that great man is neglected. The sounds which he uttered, like the dead language of an old ritual, are among a few still in veneration.

(Q.) Borelli has shewn how, by contracting the air vesicle or allowing it to expand, the fish can rise, sink, or remain stationary in the water. *Borelli de Natatu*.

74
Absorbent

75
Respiratory
organs late
in exercise,
from their
functions.

§ *Chaptal's
Elements of
Chemistry*,
vol. iii. §
art. 5.

76
Sometimes
renewed,
sometimes
changed,
different
kind.

In all living bodies the proper function of one part of the respiratory organs is, to secrete from the water or air that particular aeriform fluid which mingles with their juices, and which is necessary to life and nutrition. In many cases these organs are placed externally, and are always in contact with the air or water from which they secrete. In other cases they are lodged internally; and air or water are then alternately admitted and expelled by varieties of organs which serve as auxiliaries.

The plants secrete their aeriform fluid from water and air. They receive air along with the liquids of their absorbents, which open on the roots, the trunk, and the branches, and upon the inferior surfaces of leaves; or, if nature has plunged these leaves under water, the absorbents open and imbibe their fluids on both sides. In many, however, the upper surface of the leaf is intended to inhale air. Bonnet observed, that when this surface was applied to the water the leaf died soon; but that when the lower surface was applied, it lived for months. It has also been remarked, that the upper surfaces of some leaves will repel water; and that the death of the leaf will ensue when its breathing pores are obstructed with oil*. We hence learn why aquatic plants rise up to the surface of the water and spread their leaves in the open air: and as it is proved by Ingenhousz and others, that the respiration of many leaves is assisted by light, we see a reason why plants growing in a dark room turn to the place where light is admitted; why the flowers and the leaves of many plants follow the diurnal course of the sun; why the branches of trees, which require much light, die when placed in a thick shade; why moonshine in autumn contributes so much to the ripening of grain; and why leaves and branches are arranged in such a manner as least to intercept that quantity of light which nature has allotted to the genius of each.

The air vessels in the body of plants are those vessels which contain juices but at certain times, and which during the greatest part of the season are filled with air†. This air is collected from the sap of the roots as it passes along the diametral insertions, and from those vessels which open upon the trunk and upon the leaves‡. Like pulmonary tubes, which are seen branching through the bodies of insects, they perform an office similar to that of the tracheæ and bronchia; and are those general receptacles of air from which the neigh-

bouring parts of the plant secrete what is needed: for in plants and a certain number of insects, the functions of the lungs, the stomach, and the heart, are generally diffused. The several parts can respire, digest, and circulate fluids on their own account; and if they should chance to be severed from the whole, can live and grow, and propagate their kind.

The air vessels are surrounded by those which contain a liquid during the whole time of the growth. They are the largest vessels of the wood, as distinguished from the bark; and in the leaves they may sometimes be seen even without the assistance of glasses. Their cavity is formed by certain fibres which wind spirally like a cork-screw. In the leaf they generally approach and recede like the filaments of nerves; but they never inosculate from one end of the plant to the other, except at the extremities§; they resemble the pulmonary tubes of insects by their general dispersion over the system, and the spiral rings of which they are composed(¶); they differ in this, that the pulmonary tubes are frequently observed to anastomose in their larger branches, as the ramifications of a vein or artery do in their smaller capillary twigs.

The respiratory organs, which are similar either to the gills of fishes or the lungs of man, can hardly here claim a description, as their nature and forms are so generally known. There is one circumstance, however, in birds which arrests our attention: the cells of their bones, and the numerous vesicles of their soft parts which communicate with the lungs, have been deservedly a matter of surprise to most physiologists. In accounting for their use, the ingenious Hunter supposed that they lessened the specific gravity and assisted flying; that being the circumstance which he thought most peculiar to birds. Learning afterwards that they were in the ostrich and not in the bat, he supposed that they were appendages to the lungs. In amphibious animals, in the snake, viper, and many others, he observed, that "the lungs are continued down through the whole belly in form of two bags, of which the upper part only can perform the office of respiration with any degree of effect, the lower having comparatively but few air vessels(s)." In these animals, the use of such a conformation of the lungs was to him evident. "It is in consequence of this structure," said he, "that they require to breathe less frequently than others." From this reasoning he naturally

§ Grew's Anat. of Plants, B. 3. ch. 3. § 27—29. and B. 4. part 1. ch. 4. § 17—19.

¶ And opinions concerning the pulmonary appendages in birds, &c.

(R) See the spiral rings in the pulmonary tubes of a bee, Plate XVII. fig. 10. Swammerdam's Book of Nature, or History of Insects.

(S) The same observations were long ago made by the immortal Harvey. After observing that both the transverse and longitudinal membranous diaphragms of birds contributed to respiration, he adds, "Et alia, ut nunc taceam. Avis præ cæteris animalibus non modo facillime respirat, sed vocem etiam in cantu diversimode modulatur: cum tamen ejus pulmones lateribus et costis adeo affixi sunt, ut parum admodum dilatari, assurgere, et contrahi possint.

Quinetiam (quod tamen a nemine hæcenus observatum memini) earum bronchia sive asperæ arteriæ fines in abdomen perforantur. Aeremque inspiratum intra cavitates illarum membranarum recondunt. Quemadmodum pisces et serpentes intra an plas vesicæ in abdomine positas, eundem attrahunt et servant, eoque facilius natare existimantur. Et ut rariæ ac lutescentes cum æstare vehementius respirant, aeris plus solito in vesiculis numerosissimas absorbent (unde earum tam ingens tumor) quo eundem postea in coactione liberaliter expirant. Ita in pennatis pulmones potius transitus et via ad respirationem videntur quam hujus adequatum organum. De Generat. Animal. Exercit. 3.

Respira-
tion.

turally inferred, that the motion of flying might render the frequency of respiration inconvenient; and that a reservoir for air might therefore become singularly useful. The bat and the ostrich, however, are here as formidable objections as before. The bird respire frequently when at rest, and when it flies to our bosom from the hawk; that frequency seems to have been increased by what is a general and a common cause, an increased degree of muscular exertion. Had air cells been intended merely to prevent the effects of a rapid motion on respiration, we might expect to see them in greyhounds and a number of quadrupeds, much more readily than in some birds whose flights are neither rapid nor long.

This great physiologist was not aware that the circumstance most peculiar to birds was not their act of flying, but their feathers, which contain a large quantity of air, and which require a regular supply, whether they soar on the wings of the eagle, or remain on the ground, attending the ostrich (τ).

Both in amphibious animals and birds, the air of the vesicles has passed the respiratory surface of the lungs. In the tracheæ of plants and the pulmonary tubes and vesicles of insects, it is only proceeding on its way to be respired. Would it be worth while to inquire whether vegetable substances, and those which are called corneous in animals, require a different preparation of air from what is the common preparation of lungs? whether hair grows best, or the cuticle thickest over soft parts that are cellular and spongy (ν)? and whether the animals that bear horns have larger sinuses in the frontal bone of their cranium than others? From the general diffusion of air through the birds, and the situation of their vesicles beyond the lungs, it would appear that the pulmonary viscous in these animals does not respire or secrete air for the whole system; and we

are certain, that in plants and insects most parts respire the air for themselves, and that there is no particular part appointed to secrete air for the whole.

We here speak of respiratory organs as those which secrete an aeriform fluid from water and air; but our language probably had been more accurate had we called them the organs in which an aeriform fluid is absorbed by their liquid contents, as these flow by, either wholly or in part, in their course through the system. It was long denied that any absorption of the air took place from the pulmonary surface; and speculative reasoners had attempted to prove that no air could pass to the blood through the membranes of the lungs, because air had refused upon some occasions to pass through pieces of wet leather that had been exposed to it for that purpose. Borelli, however, endeavoured to show how air in the lungs might mingle with the blood, and how some always disappeared in respiration. There are few doubts now entertained on this subject. Venous blood inclosed in a bladder by the celebrated Priestley discovered such an attraction for oxygen, that it absorbed the aeriform fluid through all the coats of the resisting medium, exhibiting an instance and beautiful illustration of the chemical affinities which take place in this function.

The reader will observe, that the two words *respiratory organs* are here employed in what may be rather a particular sense. The truth is, there are two kinds of respiratory organs, which, though sometimes included in the general expression, should always be considered as perfectly distinct. The first kind comprehends those in which the water and air is decomposed; the second, those by which these fluids are properly applied to the respiring surfaces of the former. We observe these last in the fluttering motion of the leaf itself, or in that tendril which turns the surface of the

(τ) "The use of this retention (of the air in the vesicles of birds) is not well known to us, at least in respect of the upper pouches; so in regard of the lower ones. The use of this retention has been explained in the description of the OSTRICH: where it was shown that there is a probability that the air contained in the lower pouches serves to compress the viscera, and make them rise upwards. Some do think that this retention of air serves birds to render them lighter in flying, like as the bladder which is in fish helps them to swim. And this conjecture would have some foundation, if the air contained in the bladders of birds were as light in proportion to the air in which they fly, as the air contained in the bladders of fish is in proportion to the water in which they do swim. But to say something which hath at least a little more probability, waiting till we have a more certain knowledge of the truth and use of this retention of air, we consider that the birds generally rising very high, and even to the place where the air is a great deal lighter than it is near the earth, might be deprived of the principal advantages of respiration for want of an air whose weight might make on the heart and arteries the compression necessary to the distribution and circulation of the blood: If they had not the faculty of continuing a long time a portion of air, which being rarefied by the heat which this retention produceth therein, might, by enlarging itself, supply the defect of the weight of which the air that they do breathe in the middle region is destitute. For if there be a great many birds which do never rise very high into the air, whose lungs have notwithstanding these bladders in which the air is retained; there are also a great many that have wings which they use not for flying. And it may be observed, that there are found some parts in animals which have not any use in certain species, and which are given to the whole genus, by reason that they have an important use in some of the species. It is thus that in several kinds of animals the males have tails like the females; that moles have eyes; ostriches and cassowars wings; and that land tortoises have a particular formation of the vessels of the heart which agrees only with water tortoises, as it is explained in the description of the Tortoise." *The Anatomical Description of a Cassowary*, by the Royal Academy of Sciences at Paris. We can hardly answer for the justness of this reasoning, which maintains that the genus has useless parts merely in compliance to the species.

(ν) Nails and hair grow after death, and a quantity of air is evolved in putrefaction.

Respiration.
82
Auxiliary
organs of
respiration.

the leaf to the sun. We see them producing these oscillatory motions in the branching gills of the *pulex arborescens*. When the breathing surface is within the body, we discover them again in the tracheæ of plants, whose cavity is formed by a spiral fibre that is seemingly intended for some kind of peristaltic motion. We detect them likewise in the pulmonary tubes, in the spiral rings, and in the abdominal movements of insects. We see them in fishes swallowing the water and propelling it onward through the fringes of the gills. In the frog, we note them by the motions of the pouch between the sternum and the lower jaw. After this animal is divided transversely behind the fore legs, this pouch continues to fill and to empty itself downwards by the trachea where the lungs were. When the whole integuments and some of the muscles between the jaw bone and sternum are removed, we see how the pouch was dilated and contracted by a broad cartilage connected with the trachea, and attached by muscles to the inside of the sternum and the neighbouring parts. When the pouch is enlarged, the air rushes in through the two nostrils at that time expanded; and when it is contracting, the glottis starts up with an open mouth to the middle of the pouch, and the air is pressed down through the trachea to the lungs. This amusing sight will sometimes continue for a whole hour. In man and all the warm-blooded quadrupeds, the thorax or cavity where the lungs are placed is dilated and contracted by the diaphragm and muscles attached to the ribs. In the time of dilatation the glottis opens, as we see in birds: the air rushes in, supports the incumbent weight of the atmosphere, and enables the thorax to expand wider. The expanding powers having made at last their usual effort, their antagonists succeed, exert their force, and the air is expelled.

83
Assisted by
the pressure
of the
atmosphere.

In applying either the water or air to the breathing surface, all these auxiliary organs are assisted by the circumambient fluid which presses equally on all sides. When a Florentine flask is applied to the mouth, and all communication between the larynx and external air entirely cut off, it requires an effort to bring the air of the flask into the lungs. The weight of the atmosphere is therefore assisting in respiration; and the air, whether in the lungs or the thorax (x), must not be so dense as that which is without. When Verheyen perforated the thorax of a dog, and restored the equilibrium betwixt the external and internal air, the respiration of the lungs ceased, though for some time the alternate admission and expulsion of air was continued through canulas introduced into the wounds.

84
How this
pressure
raises the
thorax.

It cannot surely be asked here, how the pressure of the atmosphere should be assisting in raising the thorax, and thus seemingly counteract itself? The heat of the lungs expands the air as soon as it enters. The air rapidly absorbs moisture; and though not usually noticed by philosophers, yet the sudden expansion, which is always the consequence of that absorption, is a very general phenomenon in nature. By this heat, or by this absorption, the air would occasion greater dilatation, were it not for the lungs, which seek to collapse;

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the cartilages of the sternum, which seek to recoil; and the stretched-out muscles, which either spontaneously, or directed by the will, endeavour to contract and produce expiration.

Respiration.
85

Having seen how the air will rush in on the opening of the glottis, we may also conceive how the shutting of the glottis will resist the force of internal expansion, and support a weight laid upon the breast. The confined air will expand equally on all sides, and the pressure must be great before the space which falls to the glottis can exceed its own muscular force and the weight of the atmosphere. It is this diffused pressure of fluids that produces such striking wonders in hydraulics; and which explains how the droppings of the ureters should expand the bladder even to a palsy, and overcome the abdominal muscles.

86
How the
expansion
is continued.

To account for the action of these organs which serve as auxiliaries in respiration, there have been supposed an appetite for air which prompts as a stimulus; an influence of the will, though we breathe while asleep; and a natural instinct, which indeed may exist, but explains nothing. In specifying the several organs concerned, we have heard of an expansile power of the lungs, of a certain pressure of the phrenic nerve, of a muscular diaphragm, and of the action of oblique intercostals. But these explanations are from a limited view of the subject. The expressions used may indeed be general; but their meaning is particular, narrow, and confined; and their allusion is only to man, or perhaps to a few of the warm-blooded quadrupeds: for where are the intercostals of the frog? where is the muscular diaphragm of birds? where the pressure of their phrenic nerve? and where the expansile power of their lungs?

86
Opinions
concerning
the organs
of respiration.

It is fortunate for man that these assisting respiratory organs are in some measure subject to his will. By this subjection he produces vocal sound when he pleases, divides it into parts, varies it by tones, forms it into words, and enjoys the distinguished and numerous advantages that may be derived from a spoken language.

87
What organs
turn
articulate
sounds.

SECT. II. Digestion.

As respiration succeeded the placenta in one of its offices by maintaining life, the function of digestion succeeds it in another by either continuing or supporting the growth of the living body. It depends on respiration for a portion of heat, and is that function by which the liquid and solid food undergoes its first preparation in the system.

88
Digestion.

Though gaseous fluids, including the principles of heat and light, may be proved to nourish and compose the substances of all living bodies, yet a part only can enter the system in a gaseous state. This part is unchanged by the lungs, or by those fluids which they contain. The organs of digestion, before they can act on aerial bodies, must have them reduced to some new form. For the food of vegetables, this form requires to be water, whose 100 parts are found to consist of 84½ of oxygen and 15½ of hydrogen. See WATER.

89
Gaseous
fluids com-
pose the
substance
of living
bodies, and
must be
reduced to
some new
form.

4 S

When

(x) Supposing that there be any in the thorax.

Digestion.

When the gases have passed through both the watery and vegetable states, they, as juices or solids, become the food of a great many animals. These animals produce new changes, and by their preparation the gases become the food of others which are called carnivorous; and then the carnivorous and all living bodies, when the vivifying principle has ceased within them, and when they are hastening to a state of dissolution, are devoured by others who feed on corruption, are partly converted into water and gas, and become in their turn the food of the kinds on which they had fed.

As these effects of the digesting and assimilating powers are more surprising than any chemical process of art, it may not be unpleasing to take a more particular view of them. It has long been observed, that those animals which are not carnivorous feed upon plants; and, since the days of Van Helmoort and Boyle, it has been suspected that plants live upon water and air. This suspicion has now been confirmed by numerous experiments. Plants have been raised from distilled water without earth, and, instead of requiring a vegetable mould, have spread their roots in moss, in paper, in cotton, in pieces of cloth, in pounded glass, and powder of quartz. From these facts, the ingenious Chaptal has been led to suppose that soil's act but as so many sponges, affording water in different proportions, and in different ways; and that all that the plant wants from the soil is a firm support, a permission to extend its roots where it chooses, and that proportioned supply of humidity which will secure it against the alternatives of being inundated or dried up. To answer, however, these several conditions, he allows it to be necessary in many cases "to make a proper mixture of the primitive earths, as no one in particular possesses them. Siliceous and calcareous earths (he says) may be considered as hot and drying, the argillaceous as moist and cold, and the magnesian as possessing intermediate properties. Each, in particular, has its faults, which render it unfit for culture. Clay absorbs water, but

does not communicate it; calcareous earth receives and gives it too quickly; but the properties of these earths are so happily opposed that they correct each other by mixture. Accordingly we find, that by adding lime to an argillaceous earth, this last is divided, and the drying property of the lime mitigated, at the same time that the stiffness of the clay is diminished. On these accounts it is that a single earth cannot constitute manure, and that the character of the earth intended to be meliorated ought to be studied before the choice of any addition is decided on. The best proportions of a fertile earth for corn are three eighths of clay, two eighths of sand, and three eighths of the fragments of hard stone.

The advantages of labour consist in dividing the earth, aerating it, destroying useless or noxious plants, and converting them into manure by facilitating their decomposition." 91 Use of agriculture to vegetables.

So far is vegetable mould from communicating any thing new to plants, that it rather owes its formation to them*, and if sea salt should at times be requisite to marine vegetations, it is to be remembered that salts, sulphur, and lime, are all products of organized bodies; that iron (v) itself has been discovered in plants and animals; and that even diamonds, quartz, crystals, spars, gypsum, &c. are found only in those earths that are partly composed of an impoverished vegetable residue, which provident nature seems to have reserved for the reproduction or reparation of the earthy and metallic substances of the globe; while the vegetable mould on these organic parts that remain are made to serve as nourishment for the growth of succeeding plants (z). * Chaptal's Elem. of Chem. vol. iii. part 4. § 2. the beginning, and § 5. art. 3. 93 Earths and metals vegetable productions.

If those earths in which plants are reared, and which contain no vegetable mould, should ever be sensibly diminished in weight, a circumstance, we believe, which seldom takes place if proper precaution be used to prevent it; yet if it should happen, it should not in that case be forgotten that gases are the general cements in nature; that they mix intimately with the hardest bodies; and that this sensible diminution of weight

(v) Whether iron exists formally in organized bodies, or is the result of decomposition, it derives its origin ultimately from gases. Blood gradually decomposed by putrefaction yielded not only more salts and lime, but much more iron than blood, suddenly decomposed by lime. Though the greater part of an animal or vegetable, therefore, be without such substances as salt, lime, iron; yet when decomposed its parts may recombine, and thus produce them. See *Surgical and Physical Essays*, by Mr John Abernethy.

(z) "Vegetables in their analysis present us with certain metals, such as iron, gold, and manganese. The iron forms near one-twelfth of the weight of the ashes of hard wood, such as oak. It may be extracted by the magnet. We read in the *Journaux de Physique* an observation, in which it is affirmed that it was found in metallic grains in fruits. Vegetables watered with distilled water afford it as well as others.

"Becher and Kunckel ascertained the presence of gold in plants. M. Sage was invited to repeat the processes by way of ascertaining the fact. He found gold in the ashes of vine twigs, and announced it to the public. After this chemist, most persons who have attended to this object have found gold, but in much less quantity than M. Sage announced. The most accurate analyses have shown no more than two grains, whereas M. Sage had spoken of several ounces in the quintal. The process for extracting gold from the ashes consists in fusing them with black flux and minium.

"Scheele obtained manganese in the analysis of vegetable ashes.

"Lime constantly enough forms seven-tenths of the fixed residue of vegetable incineration. Next to lime, alumine is the most abundant earth in vegetables, and next magnesia. Siliceous earth likewise exists, but less abundantly; the least common of all is the barytes. *Chaptal's Elements of Chemistry*, Part iv. § 3. art. 15.

See Salts, Sulphur, Iron, Lime, in *Elements of Chemistry*. See the *Matrix of Diamonds*; see *Chaptal*, vol. iii. Part 4. § 5. art. 3.

90
Vegetables
live on pure
water.

91
Use of soil
to vegeta-
bles.

Digestion. weight may be owing entirely to some dissolution of the solid parts, and the consequent extrication of the gaseous fluids (A).

"Before we had acquired a knowledge of the constituent principles of water," resumes Chaptal, "it was impossible to explain or even to conceive the growth of plants by this single aliment. In fact, if the water were an element, or indecomposable principle, it would afford nothing but water in entering into the nutrition of the plant, and the vegetable would of course exhibit that fluid only; but when we consider water as formed by the combination of the oxygenous and hydrogenous gases, it is easily understood that this compound is reduced to its principles, and that the hydrogenous gas becomes a principle of the vegetable, while the oxygen is thrown off by the vital forces. Accordingly we see the vegetable almost entirely formed of hydrogen. Oils, resins, and mucilage, consist of scarcely any thing but this substance; and we perceive the oxygenous gas escape by the pores where the action of light causes its disengagement."

But though water constitute the aliment of plants, we must not suppose that it is the aliment of these alone: the leech and the tadpole* are nourished by water, and many animals have no other food. "Rondelety cites a great number of examples of marine animals which cannot subsist but by means of water by the very constitution of their organs. He affirms, that he kept during three years a fish in a vessel constantly maintained full of very pure water. It grew to such a size, that at the end of that time the vessel could no longer con-

tain it. He relates this as a very common fact. We likewise observe the red fishes which are kept in glass vessels, are nourished, and grow, without any other assistance than that of water properly renewed &c."

The ingenious Borelli, who knew that plants and several animals subsisted wholly by water and air, was likewise of opinion that some animals lived upon sand. He could discover nothing but sand in the stomachs of many testaceous animals that live in the water, and particularly in the stomachs of the smaller kinds that live buried in the sand of the sea. He could not conceive what else could be the food of those small fishes or worms which penetrate the substance of the hardest rocks and form excavations that always bear a proportion to their bulk. He had regularly found that the stomachs of swans which he had examined were full of sand; and, recollecting the pebbles in the gizzards of fowls, he was led to infer that these substances were somehow dissolved in a gastric juice, and served to nourish the harder parts, as the shells, the feathers, and the bones (B). These sentiments, on a slight view, might not be unnatural. From observing children of depraved appetites swallowing sand, ashes, and cinders; from having sometimes met with sand in the stomachs of wild ducks; from the usual fæces of the earth-worm; and from the dissection of several toads dug up in a garden, in whose stomachs we could see nothing but a quantity of earth, with pieces of coal, stone, and of flint, that had accidentally happened to be mixed with it (C), we long entertained a similar opinion with this celebrated author: but on recollect-

4 S 2 ing

(A) What follows is from the 33^d additional note of Dr Darwin's *Botanic Garden*.

"Dr Priestley obtained air of greater or less purity, both vital and azotic, from almost all the fossil substances he subjected to experiment. Four ounce weight of lava from Iceland, heated in an earthen retort, yielded twenty ounce measures of air.

| 4 ounce weight of | | Lava | gave | 20 ounce measures of air. |
|-------------------|------|----------------|------|---------------------------|
| 7 | ———— | Basaltes | 104 | ———— |
| 2 | ———— | Toadstone | 40 | ———— |
| 1½ | ———— | Granite | 20 | ———— |
| 1 | ———— | Elvan | 30 | ———— |
| 7 | ———— | Gypsum | 230 | ———— |
| 4 | ———— | Blue slate | 230 | ———— |
| 4 | ———— | Clay | 20 | ———— |
| 4 | ———— | Limestone spar | 830 | ———— |
| 5 | ———— | Limestone | 1160 | ———— |
| 3 | ———— | Chalk | 630 | ———— |
| 3½ | ———— | White iron ore | 560 | ———— |
| 4 | ———— | Dark iron ore | 410 | ———— |
| ½ | ———— | Molybdena | 25 | ———— |
| ½ | ———— | Stream tin | 20 | ———— |
| 2 | ———— | Steatites | 40 | ———— |
| 2 | ———— | Barytes | 20 | ———— |
| 2 | ———— | Black wad | 80 | ———— |
| 4 | ———— | Sand stone | 75 | ———— |
| 3 | ———— | Coal | 700 | ———— |

"In this account the fixed air was previously extracted from the limestones by acids, and the heat applied was much less than was necessary to extract all the air from the bodies employed."

(B) A similar inference was made by Mr Burt upon opening the stomach of the pangolin of Hindostan. See PANGOLIN.

(C) The third ventricle had a strange body fastened to its interior membrane. This body was composed of a hard membrane, in which there was gravel inclosed. Gesner says the chamois is accustomed to swallow gravel to clear his tongue and throat from the phlegm, which is apt to cover them, and destroy the appetite. *Anat. Description of the Chamois or Gemp, by the French Academy.*

Digestion. ing that many substances which enter the stomach are not nutritious; considering the balls of hair and of feathers which the carnivorous animals return, and that quantity of faecal matter which is discharged by the intestines; having frequently experienced that a sense of tunch removed hunger, and observed persons as it were by instinct pressing on the empty stomach with their hand—we began to suspect that the swallowing of sand, and a number of other indigestible substances, might not be to nourish but to prevent some cravings of the stomach, and that these cravings were in part occasioned by a deficiency of the usual pressure which it receives from the neighbouring parts. In this opinion we were more confirmed, by hearing it was customary among some of the tribes of the north of Asia to repel or mitigate the attacks of hunger by placing a board over the region which is called epigastric, and compressing it gradually by means of cords as the stomach collapses; and by learning afterwards, on a further inquiry, that a similar practice, and from similar motives, was likewise common with some individuals in this country; who, to alleviate the sensation of hunger, straiten the epigastric region with their handkerchief. This practice, however, being often impossible with the brute kind, instead of bringing the neighbouring parts to press on the stomach, they are obliged to extend the stomach, and to bring it to press on the neighbouring parts. Of the two ways of producing this pressure, the last is certainly the most natural. Senebier has supposed that distension of the stomach is the cause of the secretion of the gastric liquor; but how well or ill his opinion may be founded, daily experience permits not a doubt, that, in order to satisfy the calls of hunger, the stomach requires not only to be nourished, but to be filled, or at least to have something like a sense of fullness; and this may probably be one reason for those balls which are found in the stomachs of the chamois, which likewise swallows sand, and in the stomachs of the cow, the sheep, and of the horse, “when they do pass away the winter in snowy mountains, where they can find no grass” (D).

96
The organs
of digestion
in the ve-
getable.

From this general view of the food, the natural transition is to those organs by which it is prepared. As all plants are fed on nothing grosser than liquids, we see the reason why they are all nourished by absorbents, and why, instead of one common alimentary canal, they are furnished with a number of capillary vessels, which by their action assist the living power in moving the fluids along the trunk, the branches, and the leaves.

These fluids are observed to move between the different ligneous circles, and the more copiously as the wood is younger or the nearer the circles are to the bark. In the circles themselves, it has been remarked that the sap vessels, soon being empty during a great part of the growing season, have been called air vessels; that they are formed of spiral fibres, adapted to some peristaltic motion (E); and it is plain, that by this structure they are well fitted to propel their contents, whether water or air, upwards or downwards, backwards or forwards, according to the different positions of the plant.

Besides the particular action of the vessels, a general concussion is received from the movement of the waters or winds, which serves as an exercise; a general dilatation is occasioned by both moisture and heat; and a general contraction by dryness and cold, which produce a motion something similar to that of the thorax (F).

In the springing season the sap ascends through the empty vessels before the leaves begin to appear. When the vessels are filled through their whole extent, the buds swell, the leaves spread, and the flowers blow; the evaporation from the surface is increased; the sap is diminished by the absorption; the succiferous vessels now cease to bleed (F); and the roots being unable to supply the waste, the rains and the dews enter by the trunk, the branches, the leaves, and the petals of the flowers. When the evacuations are immoderately increased by excessive heat, or preternaturally obstructed by the plucking of the leaves, by too much humidity, or other causes which prevent perspiration, the plant soon either sickens or dies. The chyle, which is formed in the sap vessels, has generally something of a saccharine taste.

Considering the forms of animal food, we may naturally expect in the animal kingdom a greater variety of those organs employed in digestion. Most animals have indeed, like the vegetable, both inhaling and exhaling vessels, by which some of their fluids are absorbed, and evacuations regularly carried on. Except, however, in those animals which subsist by liquids, these vessels are of little importance in receiving food or ejecting what is superfluous from the system. In these animals the absorbents terminate in a hollow vitæ, which is called the alimentary canal, where the fluids undergo a preparatory change, and are partly reabsorbed for assimilation. In all others the food enters by a proboscis (G), or by an aperture which is called the

(D) Bartholine, quoted by the French Academy, thought that these balls were composed of the hair which the cows lick from their skin, or of the wool which the sheep eat. But the horse does not lick himself, and many of these balls seem to be composed of ligneous fibres. The balls which are found in the chamois are called by Velschius German *bezoar*. See *Anat. Description of Chamois or Gemp*, by the French Academy.

(E) “The superior part of the intestine, which contained about thirteen inches, had a very particular structure; for, instead of the ordinary circumvolutions of the intestines, the cavity of this was transversely interrupted with several separations, composed of the membranes of the intestine folded inwards. These separations were near half an inch distant from each other, and turned round like the shell of a snail or of a staircase with an open newel” *Anat. Description of the Sea-fox*, *ibid.* These membranous folds running spirally, are not uncommon in the alimentary canals of animals.

(F) This happens in a great many plants.

(G) Every person may have an opportunity of seeing a proboscis in a number of those winged insects which extract juices from plants. It is very easily discernible in the butterfly. In this insect it is a fine moveable tube,

Digestion
101
The food trit-
urated in the mouth
or stomach.

the *mouth*: this mouth is properly the entrance of the alimentary duct. It is very generally furnished with a tongue (*n*), which is usually assisting in deglutition; and if the food be of that nature to require cutting, tearing, or grinding, it is likewise furnished with the proper instruments (*i*) for these operations. When the food is to face us or some hard vegetable substance, and these instruments not in the mouth, something similar may generally be expected in a more remote part of the canal. The crab and the lobster have accordingly grinding teeth in their stomach, and granivorous fowls have a powerful gizzard lined with a thick corneous substance. It possesses the compressing force of the jaws; and small pebbles which the animals swallow serve it for teeth.

102
In what
manner di-
gested

Besides mere trituration or grinding, the solid food will often require to be mixed with some additional liquid (*κ*). In those carnivorous animals which chew, this liquid during the time of mastication flows into the mouth from certain glands placed in the neighbourhood. In some species of the ape kind a previous dilution takes place in two pouches situated on the sides of the lower jaw. In granivorous birds this dilution is very usually performed in a sac (*ι*), which is a dilatation of the canal; and the food being macerated there by the glands or exhaling vessels, gradually passes down (*μ*), as is needed, to be trituated and farther prepared in the stomach. In the ruminating kind the dilution is performed in a similar manner: but these having no muscular stomach fitted for grinding, instead of descending the food is brought up again into the mouth, and is then after the proper mastication sent to the stomach. If the food require no mastication, it is sent directly that way at first: a circumstance which shows a curious discernment with respect to foods, and proves that their alimentary canal is subject to the action of voluntary muscles as far as the stomach. Some of those birds which have a diluting sac or ingluvies seem likewise to ruminate.

103
In different
animals.

This in the parrot was observed by the gentlemen of the French academy. It has since been observed in rooks, macaws, cockatoos, and others: and Mr Hunter, to whom phynlogy is so much indebted, discovered, that the male and the female pigeon secrete in their ingluvies a certain liquor for feeding their young; and that most kinds of what have been thought ruminating birds do very often in expressing their food, regurgitate their food. Yet both this and another species of regurgitation which is very common with those animals that swallow indigestible substances with their food, should be carefully distinguished from rumination.

Digestion.
104
Part of the
stomach
serves as a
reservoir
birds.

To the ruminating kinds the diluting sac is by no means peculiar. The porpoise has one, though it does not ruminate; and many of those animals which have none, as the rat, the hog, and the horse, have a part of the stomach covered with a cuticle, and which must therefore principally serve as a reservoir. The gullets of several fishes and serpents are sacs of this kind. It frequently happens that a part of their prey is projecting from the mouth, while another part fills up the gullet and gradually descends, to be reduced in the solvent below. So very dilatible are the stomachs and gullets of some animals, that serpents have been often seen to swallow whole animals which, prior to the gorging, were larger than themselves; and many polypes, and even some of the loose kind, will, by swallowing food, more than double their own bulk.

105
Part of the
stomach
serves as a
reservoir

Applying *stomach* as a general word to the different Number of
ventricles of the canal, we may here observe, that every
species of animals which ruminate have two stomachs, or
at least two divisions in one; that some have three, as the
gazella; and some four, as the cow, the dromedary, and
the sheep: but it must not be supposed that the number
of stomachs is any proof of a ruminating power. It was
said already that the porpoise has two; the porcupine
has three divisions in one; and the singular cuttlefish, although it be found to have four stomachs, does not
rumi-

106
Number of
stomachs.

tube, possessing a great variety of action. It serves for a hand, a mouth, and a gullet; and when not extended in search of food, it is coiled up in circular folds. The elephant has both a mouth and proboscis, and this proboscis is one of the most singular of living organs.

(*n*) The crocodile has no tongue; the ostrich, the seal, and some others, have forked tongues; the cormorant has a double tongue; some, like the eagle, have a cartilaginous tongue; some, like the porcupine, have it toothed. We have found a bone in the tongue of a goose; the tongue of theameleon is a hollow trunk like a proboscis; the tongue of the frog is forked and long—it is rolled up in the mouth, and originates from the fore-part of the lower jaw. In some the tongue is the organ of taste; in others, the instrument for seizing their prey. In distinguishing foods most animals rely chiefly on smell.

(*i*) These instruments are corneous, bony, or calcareous; they are teeth or bills; their situation is the tongue, the jaws, the palate, or the stomach. Many teeth seem intended only for attack or defence, for seizing, killing, or retaining the prey. This is remarkable in the fangs of serpents, and in the large tusks of the elephant, the barbiroussa, and some other animals, where they have some resemblance to horns, and project from the mouth. The philodotus and ant-eater have no teeth; the larvæ of insects have generally two, which are placed externally, and cut like a forceps.

(*κ*) There are many persons whose tongues and mouths are naturally dry, and when they swallow a piece of bread must call for water or some other moistener. This complaint is even sometimes general in a family, and is propagated like an hereditary evil through its different branches. Cockatoos and parrots have likewise dry mouths.

(*ι*) The bustard has no sac of this kind; but the œsophagus is remarkable for the largeness of its glands.

(*μ*) In the ostrich the œsophagus passes down and returns, and the crop opens from below upwards into the gizzard.

Digestion. ruminates; nor, although granivorous, is any one of the four a gizzard.

Somewhat different from these expansions which we have been mentioning as existing in the first part of the alimentary canal, is a sort of pouch (N) which hangs from the neck and the lower mandible of several birds, and which, like the two pouches of apes, may be used either to macerate the food or to carry provisions from a distance to their young. The pelican, a native of warm countries, employs this pouch sometimes to carry a quantity of water; and another native of the same countries, we mean the dromedary, was observed to have at the top of the second of the four ventricles a number of square holes, which being the orifices of as many cavities between the membranes which compose the ventricle, reminded the gentlemen of the French academy of those large reservoirs of water which Pliny mentions to be in camels; and for which, according to his story, their guides have opened them sometimes in cases of extreme thirst.

We come now to one of the principal agents in digestion. Independent of the fluids which mingle with the food in the mouth, the gullet, or macerating sacs, there is one denominated the *gastric juice*, and which, either by itself or along with others from the aliments or system, acts in some measure as a solvent. It is secreted from large glands at the entrance of the gizzard, from vessels or glands in the coats of the stomach, and perhaps most plentifully near the pylorus: it powerfully resists the putrefactive fermentation; it coagulates milk and the white of an egg; it dissolves food even when inclosed in metallic tubes; and when life ceases, it acts frequently on the very stomach from which it was secreted. Its taste, its colour, and its solvent powers, are different in different classes of animals. It seems to be modified according to the age, the health, the habit, and the different aliments on which they live. The sick and the child are incapable of digesting the food that is proper for a healthy man. The hawk kind, after loathing bread and throwing it up without any change, can be gradually brought to take it for food; and Gassendi has mentioned a certain lamb which, being fed on bread, cheese, and on flesh, refused afterwards to taste grass*. But what is most surprising in the gastric juice is, that it spares all living bodies, as those worms which exist in the stomach, and the stomach itself while it is alive; and it differs otherwise from a chemical solvent, in that it has an assimilating power, and reduces all substances, whether animal or vegetable, on which it acts, to a certain fluid of determinate properties, which is called *chyle*.

Besides the gastric, the food again, after passing through the stomach, is mingled with a greenish laponeaceous liquor, which is called *bile*, and which flows either immediately from the liver or from a vesicle into which it had regurgitated as into a blind gut; at the same time nearly it is mingled with another resembling the saliva from the pancreas or sweet bread; a gland or glands whose place is supplied in a great ma-

ny fishes by a number of vermicular appendages to the stomach.

In short, from one extremity of the alimentary canal to the other, fluids are perpetually flowing into its cavity from glands, vessels, or organic pores; and the membranes constantly secreting a mucus to protect themselves from the acrimony of their contents. This acrimony must often be considerable near to that end of the canal where the faeces are discharged; for as the first part of the canal has generally one or more dilatations which are called *stomachs*, and secretes at least one fluid which is strongly antiseptic, so the last part has generally appendages which are called *cæca*, where the food always remains for some time, and where, from the quantity of animal matter that happens to be mixed with it, it becomes putrescent. The office of the cæca is sometimes supplied by the largeness and convolutions of the colon (o); to which gut the ileum cannot, when it enters laterally, so easily communicate its peristaltic motion. As the stomachs were the receptacles of the food when it entered, the cæca are receptacles of the faecal matter before it be discharged. They are of various forms and capacities; they are often larger than the stomach itself; are often composed of proportionally thin and transparent membranes; and from their contents have often a colour somewhat resembling that of the gall-bladder. Their number is different in different animals. Some have but one. The birds which have them have generally two; the bustard has three; and Swammerdam has dissected insects which had four. As some stomachs have a number of folds which hang pendulous within their cavity, and increase their surface, so have often the cæca as well as some portions of the canal. The cæcum of both the rabbit and the hare is curiously formed. It is large and beautiful; it is rolled up like a cornu ammonis; it has the like outward appearance; and a fold running spirally is observed within. The animals which live on vegetable food have usually the greatest length of the canal, and the greatest number of stomachs and of cæca: yet the cassowary, which has no gizzard, has no cæcum; and the polype, which is said to be all stomach, is properly speaking rather all cæcum.

To see more fully the process of digestion, we must not overlook that general and organic action which takes place through the whole alimentary canal. The power of mastication exerted in the mouth is obvious to all. But the force of some stomachs has till very lately been known to few; we allude here to that of the muscular or gizzard kind: for Abbé Spallanzani has divided stomachs into three sorts; the muscular, the membranous, and intermediate. The immortal Borelli, who was probably the first that tried the force of the muscular stomachs by throwing into them nuts of aliberts, hollow spheres of glass, hollow cubes of aliberts, small pyramids of wood, and several other very hard substances, supposed that the power exerted by the stomach of the Indian cock (P) was equal to 1350 pounds

107
Reservoirs
of water
in the pe-
lican and
camel.

108
The gastric
juice.

* Borelli de
Nutritione
Animal.
prop. 194.

109
The bile
and pan-
creatic
juice.

110
Other
juices.

111
The cæca
of the ali-
mentary
canal.

112
Action of
the alimen-
tary canal.

113
Strength of
muscular
stomachs
first esti-
mated by
Borelli.

(N) A pouch of this kind is observed in our common rook.

(O) The bear, whose intestines are 40 feet long, has nothing resembling a colon or a cæcum.

(P) The original is *gallus Indicus*, which in the writings of Longolius, Gesner, and Aldrovandus, means a

digestion. pounds weight. The force of an intermediate stomach cannot be so great, and that of a membranous one must be still less. Each seems to have more of the solvent as it has less of the muscular power. The most membranous are assisted by the action of the neighbouring parts, and expell their contents as readily as the strongest. The muscular fort is either wholly or principally confined to certain kinds of birds and of fishes, as nature has meant that the grain or the shells which they use as food should first be triturated before it be subjected to the gastric juice. This comminution takes place in their stomach, because it is plain that had bones or muscles, fully equal to all these effects, been placed in the head, the form of the animal must have been altered, or that equilibrium which it preserves in those fluid elements through which it moves been completely overturned.

114 motions of the alimentary canal. As to the movements of the alimentary canal, the direction of hairs found in the stomachs, and the bills of hair which are thrown up, would appear to indicate a circular motion. The intestinal part has a motion similar to that of a worm, and is called the *vermicular* or *peristaltic*. Here every portion retains its own motion, although it be separated from the rest by ligatures. The stomach of the polype, the gullets of the ruminating kinds, and the cæca, have this motion in different directions at different times; and that observed in the alimentary canal of a louse is, when view-

ed through a microscope in the time of action, amazingly rapid: the stimulating causes employed are the food, the different liquors with which it is mixed, the air, the nerves where they exist, and a portion of heat. Some degree of heat is necessary to every process of digestion both in the animal and vegetable kingdom: what that degree is depends on the nature of the living body; and is various according to its age, its health, its employments, and habits. The ingenious Hunter has mentioned the digestive and generative heats; and those gardeners who are versant in the operations of hot houses, have on their thermometers the swelling, flowering, and the ripening heats, with a great many others for the several plants which they mean to raise.

Among the other causes of digestion some authors have ranked fermentation: and it must be allowed, that something similar to the putrefactive fermentation takes place in the cæca and the lower extremity of the intestine, and that the vinous and acetous fermentations but too frequently occur in our stomach when that viscous is morbidly affected (Q).

Much of the history of living bodies relates to the different degrees of heat, the varieties of soil, and the kinds of food concerned in digestion. The plants grow where the soil and the heat are congenial to their nature; and those which admit of the greatest variety with respect to soil, and the largest range on the

Digestion.
115
The kinds of ferment employed.

116
The vinous, acetous, and putrefactive fermentations.

117
Heat necessary to digestion.

bird different from the *cocq d'Inde* or Turkey cock. Johnston has called it *gallus Persicus*. See *The Anatomical Description of two Indian Cocks* by the French Academy. *Gallina Indica* is Ainsworth's Latin for the Guinea hen. See *Borelli de Nutrit. Animal*. Prop. 189, 190, 191.

(Q) "It may be admitted as an axiom (says Mr Hunter), that two processes cannot go on at the same time in the same part of any substance; therefore neither vegetable nor animal substances can undergo their spontaneous changes while digestion is going on in them; a process superior in power to that of fermentation. But if the digestive power is not perfect, then the vinous and acetous fermentation will take place in the vegetable and the putrefactive in the food of those animals which live wholly on flesh. The gastric juice therefore preserves vegetables from running into fermentation and animal substances from putrefaction; not from any antiseptic quality in the juice, but by making them go through another process, prevents the spontaneous change from taking place.

"In most stomachs there is an acid, even although the animal has lived upon meat for many weeks: this, however, is not always the case; therefore we must suppose it is only formed occasionally. Whether the stomach has a power of immediately secreting this acid, or first secretes a sugar which afterwards becomes acid, is not easily ascertained: but we should be inclined to suppose from analogy the last to be the case; for animals in health seem to have the power of secreting sugar as I find in the milk, and sometimes in the urine from disease. The acid prevails sometimes to so great a degree as to become a disease, attended with very disagreeable symptoms; the stomach converting all substances which have a tendency to become acid into that form: the sugar of vegetables, and even sometimes vinous spirits, turning directly into acid.

"To ascertain whether there is an acid naturally in the stomach, it will be proper to examine the contents before the birth, when the digestive organs are perfect, and when no acid can have been produced by disease or any thing that has been swallowed. In the blink calf, near the full time, there is acid found in the stomach, although the contents have the same coagulating powers with those of animals who have suckled.

"Spallanzani gives the opinion of authors respecting digestion; and so anxious is he to combat the idea of its being fermentation, that he will hardly allow that fermentation ever takes place in the stomach. That fermentation can go on in the stomach, there is no doubt. It is often found that milk, vegetables of all kinds, wine, and whatever has sugar in its composition, become much sooner sour in some stomachs than they would if left to undergo a spontaneous change out of the body; and even spirits in certain stomachs almost immediately degenerate into a very strong acid. All oily substances, particularly butter, very soon become rancid after being taken into the stomach; and this rancidity is the effect of the first process of the fermentation of oil. Mr Sieffert has been able to restore rancid oils to their original sweetness, by adding to them their due quantity of fixed air; the loss of which I consider as the first process in this fermentation, similar to what happens in the fermentation of animal and vegetable substances." *Observations on Digestion by Mr Hunter.*

Digestion. the scale of heat, are the farthest dispersed over the globe. As every soil has usually some regular supply of moisture, the plants that can live upon that supply extend their roots under the surface where their liquid food is the least exposed to evaporation, and meeting there with the constant nourishment which they require, they remain in that situation for life (α). If their trunks be so feeble as to need a support, they creep on the ground, they climb the face of a neighbouring rock, or cling to the body of some of the statelier children of the forest. Their range for food is extremely limited: it is chiefly confined to the small space which happens to be occupied by their roots and branches; yet if any uncommon exertion be necessary, the branches will bend, and the leaves turn to drink of the water that is passing by. If the roots be laid bare, they will again plunge into the earth; if a stone or a ditch be thrown in the way, they will move round or slip downwards, and spread into the soil on the other side: if there they arrive at one that is unfriendly, they will not enter; but if a favourite earth should be near, though not in their direction, they will twist about, advance as they grow, and at last meet it. In all these cases the prop, the water, and soil, must be necessary; they must also be within a very small distance, otherwise the plants cannot perceive them, or will fail in their languid attempts to approach them.

110 It may be considered as a general fact, that where-
Further ob- ever food is liberally supplied for a whole lifetime in
servations one place, the creatures which use it have seldom much
on the lo- locomotive power, or much inclination to exercise it in
comotive a long continued and progressive line. The curious in-
power. sect is therefore observed to deposit its offspring in those places where the prospect of genial warmth and of plenty seem to preclude the future necessity of wandering or research; and when this offspring is about to pass into a new state, and the organs foretell that a change or perhaps a variety of food will soon be required, the appearance either of wings or of legs do likewise foreshow that the power of locomotion is to be increased. Even nobler animals in their fatal state, where they live upon one species of food, and where that is afforded in regular plenty, do spread out their roots, adhere to their soil, and become as stationary as the plant itself; and even when that supply is withdrawn, and they are expelled, yet if the state into which they emerge be helpless and feeble, if their organs of digestion have a weak solvent or masticating power, particularly adapted to some easily assimilated food, and if that food be presented either by their parent or nature without their exertion, their powers of locomotion is not great, nor is it exercised in wandering afar. It is when the organs of digestion are

strong, and the appetite inclines to variety of aliment, **Digestion.** that they are disposed and feel themselves able to wander in search of it; and that then they may be ready to move at intervals from place to place, when the enemy comes or the spirit prompts them, nature has directed them to solid food, and has given them a large alimentary canal with stomachs, with convolutions, and cæca, where they may lay up provisions for a journey; but afraid to entrust them with too much freedom, lest in their excursions they might wander from the places where subsistence is found, there are two appetites, hunger and thirst, which never fail in a state of health to remind them of their duty.

This variety of food, and the manner in which it is affected by climate, are the cause of the many and singular migrations from spot to spot, from country to country, and from sea to sea: they are the cause of a state of torpor in the hedgehog and the bear, and they partly explain the provident foresight of the ant and of the bee. **121** Animals of great locomotive power, in order to provide for themselves and their offspring, remove to a distant country or climate when they see the signs of approaching famine. Those of less locomotive power, and who are incapable of migrating far, as if warned by heaven, lay up a store for the scarcity to come; or should their food be of that kind as not to be easily preserved for a season, they receive no secret warning to hoard it at the time when it fails, their system becomes susceptible of torpor, and they are enabled to sleep through the storm of trouble and of want. The source of this want is in most instances to be traced to the nature of the plant and insect. The plant which has little heat of its own depends on the sun or some other agent for one of the great causes of digestion. When this agent refuses the necessary heat, the plant must decline; its leaves, its juices, and its fruits must fail. The insect tribe, which had no other food, or which like the plant could not maintain their vivifying warmth, must likewise submit to the same fate. The various animals which live on either the one or the other, according to their several dispositions and characters, retire to their stores, to their dens of torpor, or migrate to a country to which they are led by unseen guides to share in its abundance. Of these last the rail (s) and the swallow are the only two which are sometimes arrested, and which, with the bear, the hedgehog, and the toad, are obliged to remain in the dwellings of torpor till the genial season of warmth and of plenty.

SECT. III. Absorption.

WHEN the food has undergone the first preparation, which is called *digestion*, and the chyle (τ) is formed in the

(α) Many of the fat plants live chiefly by the absorption of moisture from the air; and many sea-plants float through the ocean, and having plenty of food wherever they go, they send out no roots in order to search for it.

(s) All the birds on the lakes of Siberia are said by Professor Gmelin to retreat southward on the commencement of frost, except the rail, which sleeps buried in the snow. Account of Siberia quoted by Dr Darwin in his *The Loves of the Plants*.

(τ) The chyle of different living bodies has not yet been analysed; in man it is generally a whitish fluid resembling milk, and yielding water, oil, sugar, and a coagulable lymph.

Absorption. the alimentary canal or sap-vessels, it is thence taken up by means of absorption for the use of the system. From the vessels it passes into the whole cellular tissue, composed of vesicles, and closely interwoven with all the vascular part of the plant. From the vesicles or utricle of the cellular tissue it enters the vasa propria and glands, which contain and prepare the fluids and secretions peculiar to the species.

In animals. In the animal economy it was always supposed that the chyle was absorbed by the ramifications of the red

The lacteals discovered in 1622. veins spreading on the gut, till the 1622, when Asellius an Italian discovered the lacteals (v) running on the mesentery of a living dog, and printed his account of them in 1627. As he had not traced their course very far, he naturally thought that they went to the liver, which was then imagined to be the organ of sanguification. This opinion, with respect to the place where they entered the veins, continued to be general till 1651, when Pecquet in France published his account of the thoracic duct (x). With great candour this author acknowledged, that he had been led to make the discovery by observing a whitish fluid mixed with the blood in the right auricle of the heart of a dog, which kind of animal it had been customary to dissect alive since the time of Asellius. "This practice of opening living animals furnished likewise occasions (says Dr Hunter) of discovering the lymphatics. This good fortune fell to the lot of Rudbec first, a young Swedish anatomist, and then to Thomas Bartholine (y) a Danish anatomist, who was the first who appeared in print upon the lymphatics. His book came out in 1653, that is, two years after that of Pecquet; and

Thoracic duct discovered in 1651.

Lymphatics discovered before 1651.

then it was evident that they had been seen before by Dr. Highmore and others, who had mistaken them for lacteals; but (adds Dr Hunter) none of the anatomists of those times could make out the origin of the lymphatics, and none of the physiologists could give a satisfactory account of their use (z)." He had not known that Glisson, who wrote in 1654, has ascribed to these vessels the office of carrying the lubricating lymph from the several cavities back into the blood; and that Frederic Hoffman has expressed the doctrine of their being absorbents very explicitly*.

It was on the 19th of June 1664 that Swammerdam discovered the valves of these vessels; and Ruysch, who had seen them, perhaps very nearly about that time, first gave an account of them in a small treatise which he published at the Hague in 1665.

The best mode of demonstrating the lymphatics we probably owe to the celebrated Nuck, who, as a specimen of that complete system of Lymphography which he meant to publish (A), printed in 1691 his adenography, or description of the glands. In this treatise he not only tells us how he brought them into view, but in his plates represents many of them as filled with his new mercurial injections; a happy invention, which perhaps was suggested by remarking the extreme subtilty of mercury when employed in the cure of venereal infection.

A method by which he inflated these vessels led him to suppose that they took their origin from veins or arteries, either immediately or through the intervention of some follicles (B). The celebrity of his name procured credit to this mistake; and notwithstanding

4 T

the

(v) We learn from Galen, that the lacteals in kids had long before been seen by Erasistratus, who called them *arteries*.

(x) This duct had been seen before by Eustachius. See *Eustach. de Vena sine pari*.

(y) The discoveries of Rudbec and Bartholine were made in the years 1651 and 1652, about which time Jolyffe an Englishman saw also the lymphatics.

(z) Dr Hunter and Monro claim the merit of having found out the true use of the lymphatics. The former says that he taught it in his lectures so early as 1746, and appeals to his pupils for the truth of the assertion. The latter seems to have made the discovery in 1753; and in 1755 published an account of it in a thesis *De Testibus in variis Animalibus*. Before the printing of this thesis, Dr Black told him that the same opinions concerning the valvular lymphatics had been long entertained by Dr Hunter. In 1756 Dr Monro attended Dr Hunter's lectures in London; heard the whole doctrine of the lymphatics very fully explained; and in 1757 reprinted his opinion at Berlin without taking notice of Dr Hunter's, who charges him with plagiarism; and the charge is retorted by Dr Monro.

(A) Lymphographia, quod offertur specimen, ubi lectori non ingratum percepero ad alias transiturus tum partes, non minus quam hæc, lymphaticis ductibus superfluentes. *Prefatio ad Adenographiam*.

Nuck had traced lymphatics on the exterior parts of the head and neck, on the membrane of the lungs, on the spaces between the ribs, in the veins, on the diaphragm, on the heart, the spleen, on the liver, the gall-bladder, on the stomach, on the mesentery, on the tunica albuginea of the testes, in the feet, and in the hands. Ita (continues he), ut multiplici experientia et variis partium præparationibus eo usque pervenerim ut *integrum lymphaticorum systema* a capite ad calcem mihi composuerim. ejus delineationem libenter tecum communicabo, ubi partium nonnullarum hæcenus nondum satis examinatarum, Lymphographiam absolvimus. *Anton. Nuck de Inventis novis Epistola Anatomica ad D. D. B. G. Med. Doct.*

(B) Quidam nervos constituunt vasorum lymphaticorum principia; alii glandulas minores; alii membranas: nec deficient qui a tendinosa musculorum parte eadem deducunt. Sed missis aliorum sententiis, dicam nolo; varia me hanc circa speculationem molitum fuisse, variis experimentis (nullo licet ordinario conatu) varia tentasse, casuque tandem nonnulla detexisse quæ lucem, hic adterre possunt.

Ante triennium, mundando leni vitulino intentus, omnique sanguine, aquæ tepidæ ope, jam cloto, copiosum in arteriam splenicam infudi aërem, et, spiritu fortius adacto, non tantum plurimas exiguas in superficie lienis vidi elevari vesiculas, sed ex iisdem vesiculis vasa prodire lymphatica, statim etiam turgida et lienem perperantia vidi, et quo diutius arteria fuit inflata, eo majorem notavi vasorum numerum, ita ut, hac arte per inflatum

Absorption. the founder opinion of Glisson, of Hoffman, and some others, the old notion that the veins performed the office of absorbents came so far down as the great names of Haller and of Meckel. The arguments, however, by which it was supported are shown now, and particularly by those of the Hunterian school, to have been injections that were not skilful, of arteries that were not accurate, and conclusions that were not logical; while the boasted assertion that birds and fishes were without lacteals and without lymphatics, has been disproved by the fortunate discovery of Mr Hewson and Dr Monro. Excepting, therefore, in the penis and placenta, and in those animals whose veins may be injected from the gravid uterus, the lymphatics seem to perform the whole business of absorption. They contain a fluid that is coagulable like the lymph of the blood, and are called valvular to distinguish them from the arteries that do not admit the red globules. They derive their origin from the cellular membrane, from the different cavities, and from the surface. Some authors say that they have seen them in the brain (c), and these Mascagni has ventured even to describe in prints. That some indeed may exist in the brain, has not been denied; but to believe that they have been found, and to trust assertions which are not countenanced by the observations of skilful anatomists, requires a faith which for our part we do not pretend to. Both they and the lacteals derive their name from the colour of the fluids which they contain. They both empty themselves into the veins; but most of the lymphatics in the human subject, and all the lacteals, first unite in the thoracic duct, which near the heart leads into the course of the circulation.

SECT. IV. Circulation.

AFTER part of the food is converted into chyle, and this chyle absorbed by the lacteals, and brought into the course of the circulation, it remains to be distributed

to all the different parts of the system. On this account, Hippocrates speaks of the usual and constant motion of the blood $\&c$ of the veins and arteries as the fountains of human nature, as the rivers that water the whole body, and which if they be dried up man dies $\&c$. He says that the blood vessels are for this reason everywhere dispersed through the whole body; that they give spirits, moisture, and motion; that they all spring from one; and that this one has no beginning and no end, for where there is a circle there is no beginning (6). In such language was the prince of physicians accustomed to express his vague ideas of a circulation; for so far was he from having acquired accurate conceptions on this subject, that when he saw the motions of the heart, he believed that the auricles were two bellowses to draw in air, and to ventilate the blood.

When after his time anatomy came to be more studied, the notions of the ancients respecting the blood were better defined; and, however chimerical they may seem to us, they were partly derived from dissection and experiment. On opening dead bodies, they found that the arteries were almost empty (e), and that very nearly the whole of the blood was collected in the veins, and in the right auricle and ventricle of the heart. They therefore concluded that the right ventricle was a sort of laboratory; that it attracted the blood from the Cava; by some operation rendered it fitter for the purpose of nutrition, and then returned it by the way that it came. From the almost empty state of the arteries, they were led to suppose that the right ventricle prepared air, and that this air was conveyed by the arteries to temper the heat of the several parts to which the branches of the veins were distributed.

To this last notion entertained by Erasistratus, Galen added an important discovery. By certain experiments, he proved that the arteries contained blood as well as the veins. But this discovery was the occasion

fluidum vas lymphaticis velens aer immixtus, membrana linealis fere tota lymphaticis ductibus obfessa fuerit visa.

Ab eo tempore exquirere cupi vasorum lymphaticorum principia ab arteriarum furculis emanare, idque aliquando intermedia vesicula, aliquando deficiente vesicula, immediate ab ipsa arteria venave. *Ad nographia curia*, cap. 4.

(c) Sed rogamus videri, utrum in cerebro etiam vasa occurrant lymphatica? Quamvis ex recentiori us, nonnulli in eorum descriptione satis liberales, eadem concedant et inde admittant: Verum, quod passim observo, systemata in proprio cerebro formant et viscera ex suo placito componunt: ad experimenta enim provocati nihil egregii prodere valent. Nunquam hac in parte, ut ingenue loquar, haecenus Scopum attingere potui. Interim non negandum censeo aliquando cerebri lymphatica in una aut altera parte fuisse visa; et non ita pridem, anatomicus quidam mihi amicissimus, inter alia, inventa, hæc nobiscum communicat. "Vidi, inquit, lymphaticum in cerebro Bovino, quod examine tuo (ut originem scias et insertionem) erit dignissimum. Non longe a glandula pineali, a qua ramos forte habet, incumbit plexui choroidæ, ad intumescens lacera sese extendens." Ante biennium ductum lymphaticum ex pini glandula eodem modo ut anis glandulis, exeuntem vidi. Ita ut quidem certissimum, et cerebrum suos habere rivulos aquosos, sed nondum distincte, in lucem protrahos. *Epist. Anat.*

(d) *Hippocrat. de Venis.* "Plato, in his *Timæus*, speaks of the heart as a watch-tower completely fortified, as the knot of the vein, and the fountain from whence the blood issues, and briskly circulates through all the members. The blood he calls the pasture of the flesh; and adds, that for the sake of nourishing the remotest parts, the gods have opened the body into a number of rivulets like a garden well stocked with plenty of canals, that the veins might by this means receive their supply of moisture from the heart as the common source, and convey it through all the sluices of the body." The rest of the passage cited by Longinus is as full of nonsense as it well can hold: and indeed Longinus seems chiefly to have admired it for something which had struck him as divine and unparalleled in its tropes, as making the head a citadel, the neck an isthmus, the vertebræ hinges, and the flesh a rampart. See *Longinus on the Sublime*, § 32.

(e) Erasistratus opened dead bodies at Alexandria.

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of some embarrassment. How was the blood to get from the right to the left ventricle? To solve the difficulty in which his new discovery had involved him, he supposed that the branches or the veins and arteries anastomosed (F); that when the blood was carried to the lungs by the pulmonary vein, it was partly prevented by the valves from returning; that therefore during the contraction of the thorax it passed through the small inosculating branches to the pulmonary vein, and was thence conveyed along with the air to the left ventricle to flow in the aorta (G). This opinion, so agreeable to fact, unfortunately afterwards gave place to another that was the result of mere speculation.— This notion was, that the left ventricle received air by the pulmonary vein, and that all its blood was derived through pores in the septum of the heart.

The passage thro' the septum being once suggested, and happening to be more easily conceived than one thro' the lungs, it was generally supposed the only one for a number of centuries; and supported likewise, as it was thought, by Galen's authority, it was deemed blasphemy in the schools of medicine to talk of another. In 1543, however, Vesalius having published his immortal work upon the structure of the human body, and given his reasons in the sixth book why he ventured to dissent from Galen, he particularly showed how it was impossible that the blood could pass through the septum of the heart. His reasoning roused the attention of anatomists; and every one grew eager to discover the real passage which the blood must take in going from the right to the left ventricle. The discovery of this fell first to the lot of Michael Servetus, a Spanish physician, who published his opinion, and revived the old doctrine of Galen, in 1553 (H). But his opinion did not spread at the time; the book in which it made its appearance contained heresy, and was therefore destroyed by public authority. Fortunately, however, the same discovery was again made by Rædus Columbus, professor of anatomy first at Padua and afterwards at Rome, who printed his account of it in 1559. Many others who were engaged in the same research were equally successful, and Andreas Cæsalpinus even singularly lucky. It appears by his peripatetic questions printed at Venice in 1571, and reprinted there with his medical questions in 1593, that he knew not only the lesser circulation, but had observed that there were times when the blood flowed from the branches of the veins towards their trunks, and that veins swelled

between their ligature and the extremities, and not between the ligature and the heart. From these observations, he necessarily inferred that the veins and arteries anastomosed; and having also contemplated the nature of all the valves which were then known, and had been known since the days of Galen, he ventured to assert that the blood could not return by the arteries to the left ventricle. One would imagine that from such conclusions he must have discovered the true circulation; but he did not. Being a zealous peripatetic, he thought himself bound to maintain with Aristotle that the blood flowed, like the tides of Euripus, backwards and forwards in the same channel; and therefore supposed that it flowed from the arteries into the veins in the time of sleep, and from the veins back into the arteries in the time of waking. The greater circulation, so far as we can learn, was not even dreamed of by this writer. A farther step was yet to be made towards its discovery; and this was reserved for another professor of the Paduan school.

In 1574, Hieronymus Fabricius ab Aquapendente, while he was seeking for a cause to explain the varicose swellings of some veins which had arisen from friction and ligature, he to his great joy and astonishment discovered their valves in one of his dissections: and here again the true theory of circulation seemed almost unavoidable. Yet whoever reads the small treatise *De Venarum Ossiolis*, first printed by Fabricius in 1603, will soon perceive that he was as far from entertaining a just notion of the circulation as his predecessors. Notwithstanding all that he saw, he still was of opinion that the blood flowed from the heart to the extremities even in the veins. He thought that the valves were intended by nature only to check and moderate its force. He calls them an instance of admirable wisdom, and mistakes his own awkward conjecture for one of the designs of infinite intelligence. In another respect, it must be confessed that he bore no inconsiderable share in promoting the discovery of the circulation (I). By writing on the valves, the formation of the fetus, and the chick in ovo, he directed the attention of his pupil Harvey to those subjects where it was likely that the motion of the blood would frequently occur.

Harvey was born at Folkston in Kent in 1578, completed his studies at the university of Cambridge, went to Padua, and was there admitted to the degree of doctor, with unusual marks of approbation, in 1602. He examined the valves with more accuracy than

(F) In toto est mutua anastomosis atque osculum apertis arteriis simul cum venis. *De Usu*, part 5. cap. 10.
(G) It was the opinion of Galen, that the motion of the lungs and the pulse of the arteries was to cool the blood, and to expel the fuliginous vapour. That he had just ideas of the other circulation through the lungs, and of the true nature of the valves, is evident from the passages cited by Harvey, *de Motu Cordis*, Exercit. 1. cap. 7.

(H) The words in which he mentions this discovery are these: "Non per parietem cordis, uti vulgo creditur, sed magno artificio a dextro cordis ventriculo, longo per pulmones ductu astatu largius fulcitur." Being born at Villa Nuova in the kingdom of Arragon, he sometimes called himself Michael Villanovanus, or simply Villanovanus. In the title of all his books he takes the name of Rædus, which is taken from Servetus, by throwing out the *de* and transcribing the five letters that remain. The book which he first very well mentioned was printed clandestinely, and in titled *Christianity Restored*. Being first republished at Venice in Daurphny, and afterwards printed at Geneva by the treachery of his correspondent and confederate John Calvin, he was, by a servant of that reformer's, accused of blasphemy, and condemned to the flames in 1553.

(I) Almost the whole merit of his discovery is due to the Paduan school, of which Cæsalpinus as well as Columbus was once a professor.

Circulation.

than his master Fabricius; and explained their use in a treatise which he published some time after. It is uncertain when he first conceived his celebrated doctrine of the circulation; but about the 1616 he taught it in his lectures, and printed it in 1628. He was the first author who spoke confidently of the motion of the blood, and who, unbiassed by the doctrine of the ancients, drew rational conclusions from his experiments and observations. His books present us with many indications of a great mind, acute discernment, unwearied application, original remark, bold inquiry, and a clear, forcible, and manly reasoning (κ); and every one who considers the surprise which his doctrine occasioned among the anatomists of those days, the strong opposition that it met with from some, and those numerous and powerful prejudices which it had to encounter from the sanction of time and of great names, must allow it was new, and that the author has from its importance a title to rank in the first class of eminent discoverers ancient or modern.

142
The merit
of Harvey
in this
discovery.

143
How the
blood is
circulated

His discovery showed, that in most animals the blood circulates in arteries and veins, and through the medium of one, two, or of more hearts: that in arteries it moves from the trunk to the branches; and that, meeting there with the branches of veins, it returns in a languid stream to the heart; that the heart communicates a new impulse; that it drives it on to the trunk of the arteries; and that the arteries, by the thickness of their coats, exerting a force, do push it onwards again into the veins.

In every part of this circulating course, there are valves situated where it is necessary; they are meant to prevent the return of the blood; they are at the beginnings of the great arteries, and are found in different places of the veins where their feeble action requires to be assisted.

The veins, before they enter the heart, generally expand into a thin muscular sac, which is called the *auricle*. It receives the blood while the heart is contracting; and when the heart admits of dilatation, contracts itself, and throws the blood into the ventricle.

We have here called the ventricle a heart; though what is usually meant by the heart be a ventricle and auricle; or sometimes a ventricle and two auricles, where the veins approach in different directions, and, without bending to meet one another, expand at two different places. Two hearts are sometimes united, so as in appearance to form but one.

144
In different
animals.

From our having mentioned more than one heart, it will be supposed that the modes of circulation are various. In some animals the heart throws its blood

to the remotest parts of the system (λ); in other animals it throws its blood only into the respiratory organs: from these organs it is collected by the branches of veins; and these branches, uniting in a trunk, convey it to an artery, which renews the impulse, and acts as a heart. In a third set of animals, the blood from the respiratory organs is carried by the veins to another heart; and this second heart, united in the same capsule with the first, distributes the blood by the channel of its arteries to the several parts. In the human foetus, and the foetus of those animals which have two hearts, a part of the blood, without taking the passage through the lungs, proceeds directly from auricle to auricle. In amphibious animals, the auricular passage continues open during their life, and is employed, when the breathing ceases, under the water. In many insects, a number of hearts, or expansions which answer the purpose of hearts, are placed at intervals on the circulating course; and each renews the impulse of the former, where the momentum of the blood fails. In the *Sepia Loligo* the two separate parts of the gills are each supplied by a heart of its own: the blood from both is collected into one; which, by two arteries opening at two different parts, send it at once to the opposite extremities. In numbers of animals, the heart, like the stomach, is in the extremity opposite to the head.

After the discovery of the circulation, the most interesting object with anatomists was to demonstrate it in a clear, satisfactory, and easy manner. Harvey, to show it with every advantage that he could think of, was obliged to open animals alive: but whether the animals were dead or alive, the larger branches of the veins and arteries were only to be seen, and even these but in certain cases, when they happened occasionally to be full of blood. That admirable method, which is now observed in demonstrating the course of the circulation, we owe to the great anatomists of Holland who flourished in the last century. About 1664, Regnier de Graaf invented the syringe, which is now used; and, accompanied with a print, published an account of it in 1669. His injection was usually a thin fluid of a blue green or some other colour; this injection transfused through the vessels, allowed them to collapse by its general diffusion, and broke out through the first opening that happened in its way. A fluid which hardened after being injected, and which preserved the vessels distended, was a happier contrivance. This at first was either melted tallow or wax, of a colour suiting the taste of the anatomist. So early as the year 1667, the celebrated Swammerdam injected the vessels running on the uterus with ceraceous matter; and, jealous

Circulation.

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How the
circulation
is demon-
strated in
dead bodies.

146
Discovery
of De
Graaf,

147
Of Swam-
merdam,

(κ) Dr Hunter says, that "none of his writings show him to have been a man of uncommon abilities. It were easy to quote (he says) many passages which bring him nearly to a level with the rest of mankind. He lived almost 30 years after Asellius published the *Lacteals*, yet to the last seemed most inclined to think that no such vessels existed. Thirty hours at any time should have been sufficient to remove all his doubts; but this subject taken up in self-defence (continues the Doctor) grows unpleasant." Dr Hunter was here thinking of his own discovery when brought in comparison with that of Harvey's. When this comparison was less immediately in view, he says that "Dr Harvey, as appears by his writings, was certainly a first-rate genius for sagacity and application; and his name is deservedly immortal on account of the many observations and improvements he made in anatomy and physiology." *Dr Hunter's First Introductory Lecture.*

(λ) We never exclude the action of the arteries.

Circulation.
jealous left another should claim the merit of such an invention, he transmitted preparations, accompanied with plates, and with a full account of his method, to the Royal Society of London in 1672. Soon after, his friend Ruysch acquired such skill in the art of injecting, that he has not been surpassed by any since his time. He discovered vessels in many parts where they were not supposed to have had an existence; and, contrary to the opinion of the great Malpighi, he showed that even many of the glands were entirely vascular; and that what had been supposed excretory ducts, deriving their origin from some follicle, were but terminations of arteries continued: yet even Ruysch could not exhibit in all cases the course of the vessels so well as we do now. Another discovery was yet to be made for demonstrating their small capillary branches running through a part. This was reserved for the very ingenious Dr Nicholls of London; who invented the method of corroding the fleshy parts with a menstruum, and leaving the wax, as it was moulded by the vessels, entire.

148
Of Ruysch.
149
Of Dr Nicholls.
150
Circulation not universal in living bodies.
From these researches, which evince circulation to be a function so general among animals, some are disposed to think it takes place in all living bodies. But notwithstanding the fashionable language of circulating fluids, of veins, arteries, and even of valves in the vegetable structure; yet nothing performing the office of a heart, and nothing that seems to conduct fluids in a circular course, has been found in plants. In the vegetable kingdom, the chyle is distributed to all the parts from the numerous vessels which convey the sap: and these vessels, being fitted by their structure to carry the sap either downwards or upwards, from the branches to the roots, or from roots to the branches; is the reason why plants inverted in the ground will send forth roots from the place of their branches, and send forth branches from the place of their roots. Even a similar distribution of the chyle takes place in some animals. In the human tœnia, in the fasciola hepatica of sheep, and in most polypes, the chyle, without a circulating system, is conveyed directly to the different parts from the alimentary canal. The taste for circulation may at

last subside. Till the business of absorption from the intestines was, of late, fully secured to the lacteals, we were wont to have also learned dissertations upon a circular motion of the bile. The jaunt which it took was not very cleanly; but it was social: it went with the forces down the intestines, and returned with the blood in the meseraic veins.

Besides the circulation, another circumstance respecting the blood, which sometimes has engaged the thoughts of physiologists, is the colour which it has in most animals. The late Mr. Hewson was of opinion, that the lymphatics, with the spleen (n) and the thymus, contributed greatly to the formation of the red globules. He was seemingly led to entertain this opinion from that attention to the lymphatics which made him ascribe much to their power, and from seeing red particles in the absorbents which rise from the splenic and the thymic gland. His reasoning, however, though very ingenious, is not conclusive. The celebrated Nuck, who had often observed a reddish fluid in the lymphatics, assures us, without any hypothesis, that such an appearance was always preternatural; and was either occasioned by a scarcity of lymph, or by some irregular and too much accelerated motion of the blood (n).

It is well known that the blood receives its vermilion colour in passing through the lungs; that animals with lungs have the blood redder than those which are seemingly without that organ; and that the colour, as well as the heat, is in proportion to the extent and perfection of the lungs. It has also been observed, that oxygenous gas is absorbed in respiration; and been proved by experiment, that the red globules of the blood, and the red only, contain iron. It thence would appear, that the colour is owing to iron calcined by the pure air, and reduced to the state of a red oxid. From this manner of conceiving the phenomena, says Chaptal, we may perceive why animal substances are so advantageous in assisting and facilitating the red dye (o).

A great variety of experiments have shewn how much the colour and consistence of the blood is altered by

(n) Before we can expect to arrive at a proper knowledge of the spleen, we have first to examine its form, its proportion, its situation, its numbers, and its different circumstances in different animals; and as yet this has been done only in a few cases. The gentlemen of the French Academy found, that in the demoiselle it was like the liver, in the bustard like the kidney of a quadruped, in the chamois round and flat, in the lynx narrow and long, in some animals proportionally large, in others proportionally small; that in the gazella it was joined immediately to the stomach, without a vas breve; that in the castor, again, it was attached to the left side of the stomach by eight veins and arteries, and as many vasa brevia; that in the otter it was fastened to the epiploon, in the Canada stag to the great ventricle; and they found that in the porcupine and sea-fox it was double. Since their time Dr Monro has observed two large spleens, one attached to the small and the other to the large curvature of the stomach of the squalus squatina or angel-fish, whose blood contains few red particles; and the same eminent physiologist found in a sturgeon no fewer than seven, one of the size of a dried horse-bean, and the rest about the bulk of a dried garden-pea.

(o) Interim non diffiteor vasa illa lymphatica lympham subinde velere rubicundo colore tinctam, loturæ carnis ad instar se habentem. Hoc autem nunquam contingit in statu naturali, verum post nimium et irregularem sanguinis motum. Vel in quibus humidum (ob defectum alimenti) deficit, qua occasione plerique humores vitiantur, et colore preternaturali tinguntur. Quid mirum itaque hisce in casibus et lympham reddi sanguineam. *Adenographia*, cap. 5.

(o) *Chaptal's Chemistry on the Properties of the Blood.* The physiologists of last century accounted for the red colour in another way. Rubedo sanguinis (says Verheyen) pro magna parte procedere videtur ab alimentorum particulis salinis ac sulphureis seu oleosis exaltatis. Cujus non leve indicium est, quod lixivium ex cineribus vulgari modo paratum notabiliter rubeat, in quo, præter aquam, vix aliud quam sal et sulphur reperibile est:—et lac (quod:

Circulation.
152
A supposed circulation of the bile.

153
Opinions concerning the red colour of the blood.

154
Respiration changes the colour of the blood.

Nutrition

155
Action of
the vessels
changes
the colour
and quanti-
ties of the
blood.

by the mere action of the vessels; and this discovery has enabled us to conjecture with more certainty than we did formerly, why in infants and phlegmatic persons the blood is paler, in the choleric more yellow, and in the sanguine of vermilion red. It explains likewise, in some measure, why the blood varies in the same individual, not only with regard to the state of health, but likewise at the same instant; and why the blood which circulates through the veins has not the same intensity of colour, nor the same consistence, as that of the arteries; and why the blood which flows through the organs of the breast differs from that which passes languidly through the viscera of the lower belly. This power of the vessels over the blood will bring us also to the true cause why the vessels vary in the density of their coats and in their diameters; why they are sometimes convoluted in a gland; why they sometimes deposit their contents in a follicle; why they are sometimes of a spiral form; why the branches strike off at various angles; why they are variously anastomosed; why they sometimes carry the blood with dispatch and sometimes slowly through a thousand windings. By those means their action is varied, and the blood prepared in numerous ways to answer the ends of nutrition and secretion.

156
Great va-
riety of di-
action.

SECT. V. Nutrition.

157
Food chan-
ged by dif-
ferent or-
gans.

NUTRITION is the function which assimilates the food in the several parts, and which finishes the process already begun in the stomach, in the lungs, and the vascular systems. In perfect animals some of the stages of this process are distinctly marked. The chyle, which has some resemblance to milk, is the work of the alimentary canal: it undergoes some new changes by the action of the lacteals and of their glands, when they exist. In the course of circulation it passes along the respiratory organs, and is mixed with oxygen or some other gas; by this mixture, the consequent heat, and the action of the vessels, it is turned into blood. The blood, when examined, spontaneously separates into three parts; an albuminous part or a serum, a coagulable lymph (p), and red globules. The two first are analogous to the white parts of an egg, by which the chick in ovo is nourished; the globules have some resemblance to the yolk, which serves afterwards as food to the chick in the more advanced period of life. The three parts contain each a variety of principles which are originally composed of gases: these principles, conveyed through vessels of various forms, of various diameters, and with various degrees of motion and of heat, and all along varying as

they pass, arrive at last on the confines of the parts which are wrapt up in a cellular tissue or some other membrane. The tissue or membrane gives a new charge; the parts nourished perform the office of secreting organs; and as the action of the vessels is varied according to the place to which they are tending and the parts which they enter, we partly see the manner in which bone, muscle, cartilage, and nerve, are all secreted from a common mass.

In worms and polypes, the function of nutrition is after digestion carried on almost entirely by the cellular tissue; and in plants by a tissue cellular and vesicular. In all living bodies the cellular tissue, besides giving a form to the parts, and besides preventing friction and cohesion, certainly performs some important office. Many have thought it the organ of nutrition; and it surely is one of the organs employed in assisting to assimilate the nutritious fluid. But it should be remembered, that all the parts of the living body are assimilating organs; that each part assimilates for itself; and that the stomach, the respiratory organs, the vessels, and nerves where they exist, are assistant to the whole and to one another.

It is singular how any should have imagined that the nerves are peculiarly the organs of nutrition, or that growth should be owing to the addition of some organic and vivifying particles pre-existing in the food. These physiologists have not demonstrated the existence of nerves in all living bodies; and these organic and vivifying particles have as yet been discovered but in their tancy. Dr Monro has condescended to prove, that the limb of a frog can live and be nourished, and its wounds heal, without any nerves: and Mr Hunter has given many curious instances of a living and nutritious power in the blood.

In plants and animals, the assimilating power has always certain limits prescribed to it: its influence is very generally confined to the sort of food congenial to the species: and its strength is varied according to circumstances; as the age, the habits, and the state of health. Those which are young assimilate faster than those which are old; and one species, which may partly be owing to the nature of their food, will assimilate much faster than another. Certain worms that feed on animal and vegetable substances will, in 24 hours after their escape from the egg, become not only double their former size, but will weigh, according to Redi, from 155 to 215 times more than before. Most oils are of very difficult assimilation; and those which are essential will often resist the long continued and the varied action of the living organs; will mingle with

158

Assimilated
by the cel-
lular tissue
and the
parts which
are nour-
ished.

159

Opinions
concerning
nutrition
and the
organs con-
cerned.

160

The rapi-
dity and
swiftness of
assimilation
in different
circumstan-
ces.

161

Essential
oils diffi-
cultly as-
similated.

(quod sulphure abundare probat butyri inflammabilitas), si coquatur cum sale lixivioso, colorem plane sanguineum contrahat; quod similiter decoctum ex aqua, sulphure vulgari, et sale tartari ad confectionem lactis sulphuris paratum rubescat; quod cerevisia et quædam alia diuturniori coctione ruborem contrahentia, iidem principia scateant, &c.

Ad intensiorem sanguinis rubedinem multum quoque contribuunt particule nitrosæ, quæ beneficio respirationis ex aere in sanguinis massam jugiter transmittuntur: siquidem color ille coccineus magisque splensens quo passim sanguis arteriosus a venoso distinguitur, in pulmonibus jugiter altius ac renovatur.

Rubedinem autem hoc modo facile excitari posse amplius confirmatur ex eo, quod vitrum, etiam centum libratum capax per unam unciam spiritus nitri rarefacti, omnino repletum appareat materia rubescente. Verheyen de Sanguificatione. Verheyen uses the word sulphur for any inflammable substance.

(p) Senac was the first who discovered this lymph.

Secretion. with the parts, and, undecomposed, communicate their flavour.

162
Assimila-
ting power
of flame.

An assimilating power is not peculiar to living bodies; it is observed in ferments and contagion and is so obvious with respect to flame which is neither living nor organized, that whole nations who have seen it feeding on inflammable substances, have been disposed to think it was animated, to call it the principle of life itself, and to pay it a kind of religious homage as the proper emblem of that Being by whom the whole universe is upheld.

In living bodies nutrition is only a species of secretion.

SECT. VI. Secretion

It is a function in which a part is separated from the whole, and generally with some change of its qualities. In the case of nutrition it was observed, that all parts secrete for themselves; and that some few, as the lungs, the stomach, the vessels, and the nerves, officiate besides for the general use of the whole system. If all the ingesta were to remain and to be assimilated, the body would go on continually increasing. But living bodies are constantly in a state of waste and repair. In most animals part of the ingesta is carried off by evacuation, without having entered the mouths of the absorbents; part, which enters the absorbents and veins, is thrown off by exhaling arteries or the urinary passage: and experiments with madder prove that the lymphatics, besides originating from all the cavities and carrying back the lubricating fluids, do enter the substance of the hardest bones, and convey particles that had been assimilated back into the blood.

163
Every
living body
in a state of
constant
waste and
repair.

164
An office
not generally
ascribed to the
absorbents.

This office has not been generally ascribed to the absorbents; nor has it been very generally supposed that the blood receives the excrementitious matters of the system, and that one intention of the circulation was either to return them for re-assimilation, or to discharge them by exhaling vessels or by the kidneys. Decayed parts, however, are discovered in the feces evacuated by the intestines, in the clouds, the sediment, and colour of the urine, and by the smell of the perspirable matter. The two last, on certain occasions, and for some time, have often supplied the place of one another; and all the three, the feces, the urine, and perspirable matter, we have reason to believe are remarkably distinguished by two kinds of odour; the one peculiar to the whole species, the other peculiar to the individual. By the perspirable matter which adheres to the ground, and of which the odour is diffused by moisture, the dog not only distin-

165
Sweat and
urine inter-
charged,
and their
odour.

guishes a man from any other animal, but is able to trace his master through a crowd.

Secretion.

The natural evacuations of plants, and of some few animals which feed by absorbents, are all by perspiration or exhaling vessels. The urine in quadrupeds is plants by before emission collected in a vesicle, and thence carried off by the genital organ. In birds, and in a number of fishes, the ureters empty themselves into the rectum, and their contents are evacuated along with the feces.

166
Evacua-
tions of
plants by
exhaling
vessels.

Besides being used to denote the function, the word secretion is sometimes employed for the matters secreted. In this sense there are various secretions. Besides the feces, the urine, and the sweat, and the vapour from the lungs, which are excrementitious, there are secretions which answer useful purposes in the system. Of these the most important and general are the bile, the saliva, the gastric juice, and the pancreatic, which assist in digestion; the lymph and the fat, which lubricate the parts; the mucus, which protects them from acrid substances; the nervous fluid, which forms a very conspicuous link between body and mind; the seminal fluid employed in generation to propagate the species; and the lacteal intended for some while to support the young after they emerge from the fetal state.

167
Some mat-
ters evacu-
ated, some
secreted for
useful pur-
poses.

The saliva is a fluid that mixes with the food in the time of mastication. In man it is secreted from the parotid, the sublingual, and submaxillary glands (Q); it is watery and somewhat viscid; it is found to retard and moderate fermentation: it has sometimes a tendency to form calculi like the urine. By these con-

168
The saliva.

cretions it incrusts the teeth and sometimes obstructs the salivary ducts. It is the seat of the rabies canina. Upon first examination the gastric liquor seems to possess a solvent power upon animal and vegetable substances without any great preference of affinity. The reason is, it varies according to the nature of the aliment; "it is sometimes acid, sometimes insipid. Brugnatelli has found (says Chaptal) in the gastric juice of carnivorous birds and some others a disengaged acid, a resin, and an animal substance, united with a small quantity of common salt. The gastric juice of ruminating animals contains ammoniac, an extractive animal substance, and common salt. In our time the phosphoric acid has been found disengaged in the gastric juice" of the graminivorous kinds.

169
Concrete.
cretions form-
ed by it.

170
The gastric
juice.

"The bile secreted by the liver is glutinous or im-

171
The bile.

perfectly fluid like oil, of a very bitter taste, a green colour inclining to yellow, and froths by agitation like the solution of soap. Its constituent principles are water, a spiritus rectior, a coagulable lymph, a resinous oil,

(Q) These glands are very rarely met with in birds. It is mentioned as a singular circumstance in the description of Numida, that "in the lower beak, on both sides of the tongue, under the inward tunicle of the mouth, there were found two glandulous bodies, from whence proceeded several lympheducts, which opened into the mouth, and there discharged, being squeezed, a white and viscid humour. There were two of them towards the upper part a great deal bigger than the others. The tongue was fleshy at top and cartilaginous underneath, as in hens.

"The tunicle of the palate was rough, with a great number of little nipples and of hard and membranous points. It likewise included a glandulous body, which bore forth two great excretories opening into the mouth. There was discovered a great quantity of other little glands at the sides of the larynx, which had also small lympheducts." *Ann. D. Hist. of the D. of Num. by the French Academy*

Secretion.

oil, and soda. The resinous part differs from vegetable resins; because these do not form a soap with fixed alkalis; because they are more acrid and inflammable; and because the animal resin melts at the temperature of 40 degrees, and acquires a fluidity similar to that of fat. From fat it differs in not being soluble in cold alcohol, in which respect it approaches to spermaceti, which alcohol cannot dissolve without heat.

Bile, like other soaps, removes spots of oil from these substances to which they are adherent; when its passages are obstructed the motion of the intestines becomes languid. It is neither alkaline nor highly putrescent. In putrefaction it yields something of a musky colour; the fossil alkali precipitates from it a green sediment; and with distilled vinegar it produces a mixture neither acid nor sweet. Like saliva and urine, it has a tendency to form concretions which are called *biliary calculi* or *gall-stones*. They are sometimes found of an irregular texture, of a brown, black, yellowish, or greenish colour. They sometimes consist of transparent chrystalline laminæ, like mica or talc, and are sometimes radiated from the centre to the circumference. They are always inflammable, of a more solid consistence than the generality of animal oils, and resemble spermaceti both in their solidity and chrystallization; they are soluble in ardent spirit when assisted by a moderate heat: the warm solution, when filtered, deposits by cooling a number of laminated white brilliant crystals, such as Poulletier de la Salle found in the bile, and which have been compared to the salt of ben-zoin, the concrete acid of borax, and to spermaceti. Many of their characters indicate that they are a substance of the same nature with the last mentioned. Fourcroy found that the substance of which these crystals are composed exists not only in the chrystallized gall-stones or bile; he observed it to a very considerable degree in a human liver which had been exposed to the air for several years, and had lost its volatile parts by putrefaction. He detected it also in a saponaceous form in bodies which had been many years buried under ground; and lately Dr Pearson of London has artificially converted the muscular fibre into a substance of a similar kind, highly inflammable, and resembling spermaceti (R).

The pancreatic juice resembles the saliva, and was examined in the last century, with a good deal of care, by De Graaf and Swammerdam. It has often been observed forming stony concretions (S).

The lymph consists chiefly of water, but, like the serous part of the blood, contains a substance which is

coagulable by heat, by acids, and by spirit of wine. It is found in the cellular membrane, in the ventricles of the brain, in the pericardium, on the surface of the pleura, in the abdomen, in the bursa mucosa, and in the joints under the name of *synovia*, where it has more than an ordinary degree of viscosity and of the lubricating quality. Sometimes, when it stagnates in the sheaths of the tendons and bursa mucosa, it acquires a thickness and forms indolent transparent tumors, which become at last gelatinous. It is secreted chiefly by arteries.

Animal fat is a substance of a nature similar to those oils which are called *fat* in the vegetable kingdom. Its colour is usually white, sometimes yellow, and its taste insipid. Its consistence is various in different animals. In cetaceous animals and fishes it is nearly fluid: in carnivorous animals more fluid than in the fergivorous: in birds, finer, sweeter, and more unctuous, and generally less solid, than in quadrupeds. In the same animal it is more solid near the kidneys and under the skin than in the vicinity of the moveable viscera. As the animal grows old it becomes yellower and more solid; and in most animals is more copious in winter than in summer. In man and some other animals, it is collected in particular follicles of the cellular membrane, accumulated in great quantities in the groin, in the axilla, in the epiploon around the kidneys and around the blood-vessels: it is likewise secreted on the surface of the skin which it protects from acrid substances, and where it sometimes concretes, often from a want of cleanliness, in the form of small worms. In cetaceous animals and fishes it is generally disposed in certain reservoirs, such as the cavity of the cranium and the vertebrae; in some it is chiefly confined to the liver; in serpents, insects, and worms, to the viscera of the lower belly, where it is disposed in small lumps, and only a small quantity found on the muscles and under the skin: in frogs it is collected in certain bags which diverge, as it were, from a common trunk, and seem like appendages to the ovaria and testes. In many places it seems to be secreted by organic pores, and under the surface of the skin by glands. It is accumulated from a diminution of perspiration, from the nature of the aliments, from morbid affection, and from idiosyncrasy. It is of the same nature as the fixed oil of plants; and Lorry has found a striking analogy between it and the bile *.

It is a bad conductor of heat, and preserves the warmth of those regions where it is situated. It is more adhesive and less apt to evaporate than water, and is therefore a better lubricating fluid. When absorbed, it counteracts the saline impregnation if too copious;

Secretion.

176
Fat.177
Its kinds in different animals.178
Where found in different animals.179
Analogous to the bile.

* See Fourcroy.

180
Its uses.

(R) The means which he uses is digestion in water; and the process supposes a previous acquaintance with what is common and what peculiar to the fibre and the fat. He maintains that the fibre is entirely composed of carbone, oxygene, hydrogen, and azote. In a high temperature these are decomposed, or at least separated, without producing fat. But when the fibre is kept in water in a low temperature, the carbone unites with the hydrogen of the water, and forms a fat resembling spermaceti, and highly inflammable. Part of the oxygene, too, uniting with azote, forms the nitric acid; and part of the azote uniting with the hydrogen constitutes ammonia; so that three substances are thus formed.

(S) De Graaf was of opinion, that calculi might be formed in all glands. He had seen them above twenty times in the pineal gland, that was long thought the residence of the soul:—He says, too, that they occur more frequently in the pineal gland of Frenchmen than of Dutchmen; and very pleasantly assigns this reason, that the volatile spirit of a Frenchman requires more ballast than that of a Hollander. *De Succo Pancreatico*, cap. 7.

172
Concretions formed by it.173
Muscular fibre converted into fat.174
The pancreatic juice.175
The lymph.

Secretion. copious; and its nutritive power is as three to one when compared to that of the muscular fibre. These properties may partly serve to explain its uses around the several branches of the blood-vessels in those parts which require warmth, and in those which are anywise exposed to motion. They will likewise account for its being more copious in winter than in summer (τ); and for its being found in great quantities in the marmot, the dormouse, in the bear, and those animals in general which are constrained to a long abstinence. It forms sometimes steatomatous tumours, and contains the sebæic acid, which acts readily on lead, copper, and iron.

181 **Vegetable fat.** The vegetable fat is contained chiefly in the fruit; and is known by the names of *fat oil*, *sweet oil*, and *oil by expression*. It freezes in different degrees of heat, and varies according to the nature of the plant by which it is afforded.

182 **The mucus.** The mucus is more viscid than the lymph, and is not coagulable by fire or alcohol. It is mild, not disposed to corruption, nor soluble in water. This secretion is performed by glands. These glands, in the pulmonary phthisis, secrete often a mucus that resembles pus, and occasions a suspicion of ulcers where there are none. Mucus is found in the nose, through the whole length of the alimentary canal from the mouth to the anus, in the aspera arteria, in the bronchia, in the kidneys, ureters, bladder, and most of all in the urethra. It forms hard stony concretions sometimes in the lungs.

183 **Concretions formed by the seminal fluid.** The seminal fluid has been seldom the subject of chemical analysis. It is heavier than water, soluble in urine, deliquesces in air and with heat, it hardens with the fixed alkali, and is not coagulable by alcohol. It contains a number of animalculæ; and in the system in which it is secreted, it affects the passions, the manners, and the voice, the taste of the muscles, the secretion of fat, and the growth of the hair. In many fishes this fluid is contained in a sort of bags. In most animals it is secreted by glands, which are called *testes*, and is accumulated in the vasa deferentia, or where they exit in the seminal vesicles. Of these vesicles Swammerdam observed long ago, that in the scorpion they were probably "adapted by nature to secrete a seminal matter different from that supplied by the testicles; they are largely (he says) supplied with glandules to answer that purpose, and consist of a considerably thick and spongy substance." Mr Hunter since has endeavoured to show that they secrete a particular fluid in all animals.

185 **The nervous fluid.** So little are we acquainted with the nervous fluid, that some have doubted of its existence. The discovery, however, of Galvani, and the numerous experiments that have since been making on animal electricity, leave us not without all hope that something yet may be known of its properties that will greatly illustrate several phenomena in the animal economy.

186 **The milky fluid.** The lacteal secretion is generally confined to one sex, and is peculiar to the class of mammalia, though something similar may perhaps be secreted in the crops of pigeons.

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Secretion. It would be impossible here to enumerate or to tell the uses of all the different kinds of secretions in living bodies. We cannot enumerate all that we know without running into tedious detail. The essential oils, the camphor, the gums, the balsams, the resins, and many others, are various secretions of the vegetable kingdom. Each species of plant and animal has generally some peculiar secretion; and this secretion in the individual has often some distinguishing quality, discoverable by taste, by colour, or by smell. These different secretions have likewise each their particular uses. We know the intention of the oily juice with which the bird dresses its feathers, of the glutinous fluid of the fish, of the viscid mucilage of the snail; we see the purpose for which the viper sometimes employs its virulent humour, and for which the scuttle-fish ejects its ink: but yet we know only in part.

187 **Each species has peculiar secretions.** The difference among the various secretions of the same system seem principally owing to a difference of stimulants, and to some difference in the action, the form and the irritable power of the secretory organ. Passions of the mind very often affect the secretions; and it frequently happens that passion and medicine affect one secretory organ and not another. It is therefore probable that the organs of secretion, and the smallest fibre is an organ of this kind: we say, it is probable that the organs of secretion, like the eye, the ear, and all the different organs of sense, are each affected in some measure by peculiar stimulants; as the stomach by hunger, the fauces by thirst, and the genital organs by venereal orgasmus.

189 **To what reduced by chemical analysis.** Fermentative mixture, and some original impregnation of the organs, have also been brought to explain the several phenomena of secretion. We conclude with observing, that however much the various fluids of living bodies may differ in appearance, chemical analysis has generally reduced them to a water, a gluten, a saline impregnation, and an oil.

SECT. VII. Integumentation.

190 **Integumentation.** ALL living bodies are furnished with one, two, or more integuments, which are prepared by secretory organs, and which are a defence against those injuries to which their situation is commonly exposed. Of these integuments, some prevent the dissipation of the fluids, some again resist acrid and corrosive substances, some are indigestible in the stomach, and some are seemingly incorruptible in the earth. By these properties they preserve seeds and the ova of insects for a number of years, waiting the change of soil or of season. They protect both from the action of weak membranous stomachs, and make those animals who choose to swallow them contribute likewise to their propagation. The gelatinous substance ejected by birds, and called the *tremella-nosloc* or *starfall*, we have lately found, by numerous experiments, to be a substance of this kind. It is nothing else than the oviducts of frogs, which, as the embryo in form of an egg moves along their winding canal, are intended by nature to secrete that transparent and viscid glaire which

4 U which

Integumenta.

192
Some integuments form a defence by their hardness;

which constitutes the albuminous part of the ovum, and feeds and protects the embryo in water (v).

Some integuments are chiefly useful by their strength and hardness. The shells of the beetle are an excellent defence for the membranous wings which the creature is seen to pack up in folds when it inclines to creep into the earth. The shell of the snail lodges the intestines (x) when the animal comes forth to search for its food, and it furnishes a safe retreat for the body when any danger is threatened from without. Some animals, confined to their shells, can open and close them by a muscular power; and some shells, like the scales observed on fishes and insects, are disposed into plates, so as to be no hinderance to motion. Several insects which spend a part of their time in the water always compose a shell for themselves where it is needful. The usual materials are sand, straws, or mud, which they cement by a viscid secretion. The shells of most insects are corneous. Swammerdam found that cretaceous shells are composed of layers of indurated membranes, and that they are sometimes covered with a cuticle.

193
By their hair, down, or feathers;

Some integuments are covered with feathers, some with hair or a thick down. Besides many other obvious uses of these coverings, they serve in general to repel insects; and being bad conductors of heat, maintain a genial and necessary warmth.

194
By their prickles;

When the integuments are covered with prickles, they repel attacks by the strength of their points, or by the venom which they infuse, as the stings of nettles and the downs of some insects and plants.

195
By a viscid secretion;

When they are moistened with a viscid secretion, they preserve the necessary softness of the parts, prevent evaporation, resist acrimony, enable plants to destroy their enemies, and assist the snail in performing its motions.

196
By their effluvia;

Both plants and animals, but particularly the former, are often protected by an odorous effluvia from their integuments. This effluvia is the finer part of their volatile oil, always inflammable, and so subtle, that the continual emission of it from wood or flowers does not sensibly diminish their weight. To this fragrance it is owing, that the deadly nightshade, the henbane, hounds-tongue, and many others, are seen on almost every high road untouched by animals. The mace-nelle-tree of the West Indies emits so very dangerous vapours, that the natives poison their arrows with its juices, and those have died who have ventured to sleep under its shade. The lobelia longiflora of America produces a suffocating oppression in the breast of those who respire in its vicinity. The return of a periodical disorder has been attributed to the exhalation of the rhus toxicodendron. Every one knows, says Chaptal, the effects of musk and oriental saffron on certain persons. Ingenhousz mentions a young lady whose death was occasioned by the smell of lilies; and Triller re-

ports an instance of another who died in consequence of the smell of violets. The selection of grasses by different animals seems to be owing to the manner in which the volatile aroma affects their senses. But of all the vegetable exhalations known, those emitted by the bohun-upas, or poison-tree of Java, are the most remarkable. For many miles round no animal can breathe the air, no plant dares to peep from the soil, the fishes die in the poisoned stream, and the birds that venture athwart the atmosphere with despairing shrieks sink down lifeless. Such often is the use of the fragrant oils in the vegetable economy. The shrubs and trees that are covered with thorns are in general a grateful food to animals. They generously avow their manner of attack, and scorn the dark assassination by poisons.

The various colours of the integuments, as well as the aroma, is a species of defence. "Caterpillars which feed on leaves (says Darwin) are generally green; and earth-worms the colour of the earth which they inhabit. Butterflies which frequent flowers are coloured like them. Small birds which frequent hedges have greenish backs like the leaves, and light-coloured bellies like the sky, and are hence less visible to the hawk who passes under them or over them. Those birds which are much amongst flowers, as the goldfinch, are furnished with vivid colours. The lark, partridge, hare, are the colour of dry vegetables or earth on which they rest; and frogs vary their colour with the mud of the streams which they frequent (v), and those which live on trees are green. Fish which are generally suspended in the water, and swallows which are generally suspended in the air, have their backs the colour of the distant ground, and their bellies of the sky." The sphinx-convolvuli, or unicorn-moth, resembles in colour the flower on which it rests; and among plants, the nectary and petals of the ophrys, and of some kinds of the delphinium, resemble both in form and colour the insects which plunder them, and thus sometimes escape from their enemies by having the appearance of being pre-occupied. From colour being thus employed as a defence, many animals vary their colours with the seasons and circumstances; and those which are of different colours in summer according to the places which they inhabit, do all in winter assume in common the colour of the snow.

But a change of colour is not the only change of the integuments. As the outmost are often insensible to stimulants, and for obvious reasons possess little of the vital principle, in all cases where they cannot be enlarged to admit an additional increase of growth, or are charged them-selves.

(v) We have often inflated the oviducts of frogs, and dried them; and afterwards putting small pieces of them into water, have seen them swollen in a few hours to a large size, and forming the tremella-nostoc or starfall.

(x) This snail is found in our gardens, and carries its shell, including the intestines, upon its back.

(y) The same is the case with many fishes that live in lakes.

(z) Several small animals in changing their integuments change likewise the interior coat of the alimentary canal, which they void with the faeces.

Irritability. bird his feathers, the quadruped his hair, and sometimes his horns, the serpent his skin, and man himself renewing the scales of the epidermis. These changes usually take place once a-year, twice frequently with respect to serpents, and oftener in toads, who have been observed to devour the skin which they throw off. All the integuments of ova and seeds, being wholly the production of parental organs, neither are nor can be repaired.

SECT. VIII. *Irritability,*

Irritability. Is that property of the living fibre by which it acts in consequence of stimulants. Being one of the great causes of motion in living bodies, no property has excited more wonder, been the cause of more error, or exhibits such a number of striking phenomena to the senses. These effects, however, have arisen rather from the nature of the stimulants than from any thing mysterious in irritability. Many of the stimulants by which this property in bodies is displayed are often invisible, unknown, or unthought of; and men being conscious that a number of their motions proceed from a stimulant, that is, under the direction of a mental power, they readily conclude from a sort of analogy, that every motion in plant and insect that seems to answer a useful purpose, and is caused by some invisible stimulant, is the consequence of mind directing from within. They further suppose that irritability is in all cases the consequence of nerves, which are those organs which nature has employed in the animal kingdom to convey stimuli between body and mind. These singular conclusions have led to others that are less admissible even than themselves. It has been imagined that creatures the most stupid possess within them a principle of mind that is incapable of further improvement, but which notwithstanding is in many respects superior to reason, and a surer guide in whatever relates to self-preservation or that of the species: it enables the animal to predict without foresight, and to act rationally without intelligence. This wondrous principle has been called instinct: and in order to account for some of the singular phenomena of vegetables,

a share of it has graciously been allowed to plants; which having become favourites of late, have been also presented with the privilege of sensation, permitted to fall in love, and to marry, and on some occasions to exercise the faculty of volition.

At these concessions the metaphysician will naturally smile. He knows how many impose on themselves by the mere sound of their own words, as if by calling the snow black they were to discover a new property; which curious discovery would turn out at last to be only a gross ignorance of language, and the foolish misapplication of a syllable. He who has studied the philosophy of mind, and been accustomed to view objects through another medium than the magic colourings of passion and of fancy, readily perceives a something of absurdity in ascribing such wisdom to plants and insects. With respect to animals, these gentlemen do not recollect that voluntary actions are of two kinds, as they proceed from design or propensity; that in performing one of these kinds the mind itself has an object in view, and is properly the source whence they originate; but that in the other the mind is merely a secondary agent, is acting under the influence of stimuli. It is often not aware of the consequences, or although aware is often so infatuated as not to regard them, however fatal. It is generally well known to the naturalist, that not a few of these propensities arise from the form and structure of the body, from the manner in which the optic nerve is affected by colours, the olfactory by smells, the gustatory by tastes, and the auditory by sounds; from the different ways in which the fauces are affected by thirst, the stomach by hunger, and the genital parts by venereal orgasmus.

Besides these and other propensities which operate as stimulants in the system itself, the naturalist has found that light, heat, and moisture, in various degrees, from absolute darkness, coldness, and dryness, act as stimulants upon living bodies: he has experienced that electricity is a general agent, that several plants emit flashes (A), and that some animals even give shocks resembling the electric. He has made it probable that

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(A) "In Sweden (says the author of the *Loves of the Plants*) a very curious phenomenon has been observed on certain flowers by M. Haggeren, lecturer on natural philosophy. One evening he perceived a faint flash of light dart from a marigold: surprised at such an uncommon appearance, he resolved to examine it with attention; and to be assured that it was no deception of the eye, he placed a man near him with orders to make a signal at the moment when he observed the light. They both saw it constantly at the same moment; the light was most brilliant on marigolds of an orange or flame colour, but scarcely visible on pale ones; the flash was frequently seen on the same flower two or three times in quick succession, but more commonly at intervals of several minutes; and when several flowers in the same place emitted their light together, it could be observed at a considerable distance. This phenomenon was remarked in the months of July and August at sunset, and for half an hour after when the atmosphere was clear, but after a rainy day or when the atmosphere was loaded with vapours nothing of it was seen. The following flowers emitted flashes more or less vivid in this order: The marigold, garden nasturtium, orange lily, African marigold; sometimes it was also observed on the sun-flowers; but bright, yellow, or flame colour, seemed in general necessary for the production of this light, for it was never seen on the flowers of any other colour. The flowers were carefully examined with a microscope without any insects or phosphoric worms being found. M. Haggeren, after having observed the flash from the orange-lily, the anthers of which are a considerable space distant from the petals, found that the light proceeded from the petals only; whence he concludes, that this electric light is caused by the pollen which, in flying off, is scattered upon the petals (*Observ. Physique par M. Rozier*, vol. xxiii. p. 111.)"—Addition to the note on *Tropaolum*, the *Loves of the Plants*. The author of this beautiful poem supposes, that the time of the twilight is sometimes extended by different bodies emitting the light which they had absorbed during the day.

Irritability.

207
Irritable
principle
affected by
various st-
mulants.

it produces all the wonders of crystallization; and that the cause of chemical affinity, and of all the phenomena displayed by the magnet, is at least akin to it. In the male parts of plant and animal, he has seen both the fluid and the pollen that give the stimulus in generation, and are accompanied with so extraordinary changes in the system. He has found that much of the vegetable economy, and that even the function of generation itself, as the development of the fecundating powder, and its application to the female organ, is partly carried on by wind, heat, and other such agents. He has reason to conjecture that many general agents in nature are yet unknown. By the help of chemistry, he has found out lately a considerable number which are called gases, which are of the very highest importance in both the animal and vegetable economy, and which, like the aromas of plants, or the causes of contagion, produce their effects without being visible. It is only, too, of a late date that the celebrated professor Galvani of Bologna has excited so much curiosity through Europe, by the discovery of a certain stimulus that resides in the nerves, that passes along electric conductors, and which by a certain application of metals occasions a vivid flash in the eye, convulses the body of a living frog, and rouses the detached limbs into action. The change of colour in the integuments according to different seasons and circumstances, though it answers a rational and useful purpose, proceeds from a cause that does not seem to be very well known. Even many agents which are not invisible, nor yet unknown, exert their influence in a secret manner, so as not to be obvious to the senses. It is generally known that many singular movements of plants are owing to heat, many to light, and several to moisture. The barley-corn is often observed to creep on the ground by means of its awn, which dilates and contracts according to the different degrees of moisture. The wild oat, employed as an hygrometer, moves through the barn, travels through the fields, nor ceases to be changing its situation till its beard fall off, or till it meet with a soil where it conveniently may strike root. Upon a similar principle of motion, the ingenious Edgeworth constructed an automaton which moved through a room which it inhabited. It is easily conceived how these singular effects, arising from causes that are unknown, invisible, or unthought of, should give birth to the notions of witchcraft and of instinct, and impress the fancy with an idea of something resembling sensation and volition in the vegetable kingdom. These agents, whether invisible, unknown, or unthought of, directed by regular and uniform laws under the great Author of nature, produce effects that indicate prescience, wisdom, and design, and causing a transient or permanent propensity in the mental part, frequently controul by restless sway the finite minds

that reside in matter. These minds, in a living body, have generally been found accompanied with some system of nerves; and these nerves happening with equal facility and promptness to convey stimuli from the mind to the body and the body to the mind, the great difficulty has been to determine with respect to others when the action proceeds solely from design, solely from propensity, or from design and propensity together. The uniform conduct of the brute creation would seem to imply that their mind has little of inventive power; that it generally acts from the impulse of propensity; and that its manners are varied, not in consequence of a change of sentiments, but from the induction of new habits, and the application of new stimulants.

It has been observed, that in all animals the vigour of mind has some relation to the quantity of brain, and to the perfection of its organization; and that the acuteness of the different senses is generally proportioned to the quantity of nerve bestowed on their organs. Man has a greater proportion of brain than any other animal; but many an animal has a much greater proportion of nerve bestowed on different organs of sense. Many animals have therefore acuter senses than man; but man has a greater vigour of mind than any other animal on this globe.

The brain of quadrupeds is somewhat similar to that of man, but proportionally smaller, and not perhaps so well organized. Willis has observed, that among quadrupeds the structure of the cerebrum is more variable than that of the cerebellum; that the former generally furnishes nerves to the voluntary muscles, and the latter with the medulla oblongata to the involuntary. He has likewise remarked, that the round prominences commonly called the nates and testes are large in the quadrupeds, which are active and vigorous, and in some measure able to procure their own subsistence at birth; that the tuber annulare is large in the quadrupeds that are distinguished for their sagacity; that wherever the tuber annulare is small, the prominences are large, and wherever it is large the prominences are small. From these observations he has concluded that the tuber annulare is the seat of genius, and the round prominences the seat of what has been called instinct (c).

The brain of birds is seemingly the reverse of the human brain; the cortical substance is the interior, and the ventricles are situated in the white part on the outside. In the brain of the bird there are no circulations like the intestines, no fœx, corpus callosum, nor corpora striata.

The brain of fishes is in many respects similar in its structure to the brain of birds. It is very small in proportion to their body, and is generally surrounded with an oily matter. In one genus of fishes, the gadus, Dr Monro found spheroidal bodies between the dura

(b) The acuteness of the senses depends upon the readiness with which their organs are affected by stimuli. This readiness depends on irritability. It is not necessarily connected with mind, nor should it ever be confounded with perception, which in classical language signifies a property of the mental principle.

(c) Few perhaps who have dissected different animals, and who, besides a number of structures, have seen a variety of tubercles and lobes existing in the brain, will be rash in ascribing to any one of them one particular office. The pineal gland was for some time thought the seat of the soul. It was afterwards found to be of

tea

Irritability. dura and pia mater, and covering the greater part of the nerves like a coat of mail. The two senses, seeing and hearing, in many fishes are often acute. By laying one ear on the water, and striking the surface at some distance, this element is found to be a better conductor of sound than even the air.

214
Of reptiles, The reptile tribes have very little brain, and like the fishes have no ganglions upon their nerves.

215
Of insects. Most insects have no brain at all, but a nervous cord that is full of ganglions, that runs from one extremity to the other, and is denominated the spinal marrow. This knotty cord, however, is not marrow; the insect has nothing resembling a spine; and the situation of the cord in the animal is often not along the back but the breast. In the silk-worm, and most other insects, this cord is in contact with the alimentary canal; and the first ganglion, which is sometimes called the brain, though not in the head, divides, in order to give a passage to the stomach, and again unites in a second ganglion. Swammerdam found in a species of snail a brain with two lobes, in contact with the stomach, moveable by muscles, and without a fixed place in the body.

216
A moveable brain in a species of snail.

217
Polypes. The polypes exhibit no appearance of brain or of nerve, as in other animals. Their skin, however, is observed to be full of a number of small granular bodies, which are connected by a glaucous matter that resembles a thread. Like rows of bead-strings, they extend from one extremity to the other, and along the arms. Trembley learned from a number of experiments that they received their colour from the food, and therefore supposed them to be vesicles or glands. If not like the tuberos nerves of the insects, they at least are not very different in appearance from the nerves of the

gadus that are covered with a number of spheroidal bodies like a coat of mail.

218
Nerves act under other agents besides mind. Some things would insinuate that a nervous system does not seem to be necessarily connected with mind. The stimuli of nerves may be brought into action by other causes besides mind. Even many nerves are not subjected to the influence of mind; and the mind often by its own inattention may lose the power which it originally possessed over nerves. Many persons can move the muscles of the ear, and others may have lost that power through neglect. After Fontana had observed that the heart was a voluntary muscle in a wheel polype, he learned to retard and accelerate the motions of his own at pleasure. If some nerves, from a sort of prescription, thus cease to be obedient to the power of mind, others by frequent service and habit become so obedient as to convey their stimuli to the muscles almost without the consciousness of mind. The motions excited by the stimuli of nerves are in many cases exceedingly rapid. These may be seen in the wings of most insects, but are most noticed in dancers, tumblers, and apes, and all those animals that are exhibited for feats of agility.

219
The great influence of the nerves. The motions which we see excited in the body by the stimuli of nerves have often been so vigorous and prompt, as to have torn the muscle from the bone, and to have broken the bone itself. They often affect the organs of secretion, have often unhinged the fabric of the system, occasioned death, and accounted for the miracles that have been ascribed to the power of fancy. The prompt motions of what have been named sensitive plants seem owing to a different species of stimulants acting on extremely irritable fibres (v).

In the animal kingdom all muscles in the time of action

ten filled with stony concretions; and the celebrated Nuck, instead of assigning to it any prerogative, contented himself with writing its epitaph.

VIATOR

Gradam. Siste.

Omni que Conatu. CONARIUM.

Respice. Sepulchrum.

Partem. Tui. Corporis. Primam.

Ut. Olim. Volebant.

Animæ. Sedem.

GLANDULAM. PINEALEM.

Hoc. Seculo. Natam. Et. Extinctam.

Cujus. Majestatem. Splendoremque.

Fama. Firmarat.

Opinio. Conservarat.

Tamdiu. Vixit.

Donec. Divinæ. Particulæ. Aura.

Avolaverat. Tota.

LYMPHAQUE. Limpida.

Locum. Suppleret.

Abi. Sine. GLANDE. Viator.

Lymphamque. Ut. Ahis. CONARIO. Concede.

Ne tuam Posteris

Mirentur Ignorantiam.

(v) In many instances the prompt motions of animals seem more owing to the irritability of their fibres than to what has been called the sensibility of their nerves. The poet was mistaken when he supposed that the mangled insect would feel as sensibly as a mangled giant. When the gad-fly fixes fairly on the hand, you may cut off its wings, its legs, its antennæ, and a part of the lower division of its body, without disturbing its gratification, or apparently occasioning to it much trouble.

210 Irritability; action are observed to discharge a quantity of their blood; and those muscles which are naturally white are the most irritable. In all living bodies, the irritable power will cease to obey the action of a stimulant if either long or violently applied. After exercise, therefore, the irritable fibre requires rest, after heat cold,

211 Effect of stimulus when long continued. after waking sleep, before it again becomes submissive to the action of the stimulant that overwhelmed it. This is the reason that in plants and animals there are certain exertions and functions of the system that can only be continued at intervals and seasons. The natural stimuli of involuntary muscles continue to act, and the muscles continue to obey through life.

212 Organs of sense intended to give distinct impressions. The organs of sense were formed to mark the difference of stimulants; yet living bodies are affected by light without having eyes, by sounds without having ears, by odorous effluvia without having smell, and by sapid bodies without having taste. It is easily conceived how these objects, by their inherent properties or motion, may produce a confused sort of excitement in every highly irritable fibre. But the organs of sense are peculiarly fitted to receive accurate and distinct impressions from each of these objects; and these different impressions seem not to arise from any difference in the kind of nerves by which they are received. All the difference that has been observed arises from the structure of the organ itself, and from the manner in which the nerve is distributed through it. Other parts of the animal body, as the stomach, the fauces, and genital organs, are thus affected by particular stimulants; and many animals, and even vegetables, may be affected in various manners, and by various stimulants, of which neither our feelings nor our senses can give intimation of any thing analogous.

213 Different organs affected differently by the same stimulus. With respect to the several organs of sense, some animals have many eyes without any motion, and some animals have few eyes with varieties of motion: The entrance to the ear in some animals is from the mouth, as happens in the frog; and the bones of the ear are without the cranium, as in some fishes. The sense of smelling is found in the nose: this sense is astonishing in dogs; and even sheep, in distinguishing their lambs, trust to it more than to seeing or hearing. The sense of taste is far from being general; and the sense of touch can hardly be said to reside peculiarly in any one organ.

214 The organs of sense. With respect to the several organs of sense, some animals have many eyes without any motion, and some animals have few eyes with varieties of motion: The entrance to the ear in some animals is from the mouth, as happens in the frog; and the bones of the ear are without the cranium, as in some fishes. The sense of smelling is found in the nose: this sense is astonishing in dogs; and even sheep, in distinguishing their lambs, trust to it more than to seeing or hearing. The sense of taste is far from being general; and the sense of touch can hardly be said to reside peculiarly in any one organ.

SECT. IX. Motion.

215 Motion. IRRITABILITY is one of the great sources of motion in all living bodies; and this power is brought into action immediately by nerves or some other stimulants. Locomotion here is principally considered; for altho' the kinds of internal motion employed in secretion and the other functions be as remarkable, in the eye of the philosopher they have not so generally attracted the attention. Most animals are capable by nature of changing the place which their body occupies; for this reason the irritable fibres being formed into bundles, which are called *muscles*, are in most animals attached to bones, cartilages, or hard integuments, which they move as levers: these levers, with their muscles attached, are in most cases formed into wings, fins, and legs of various kinds, and are employed in performing

the motions of flying, swimming, walking, leaping, and creeping. So very necessary, in the opinion of some of the ancients, was one or other of these instruments to progressive motion, that the movement of the serpent was often ascribed to a preternatural cause, was supposed to resemble the *incessus deorum*, and procured to the animal one of the highest and most honourable ranks among the emblematic kinds of divinities. Even Moses himself, who was unwilling to allow it the character of an agathodæmon or good genius, was yet so puzzled at its being able to move without feet, that he pronounces it a tool of the devil; and says that it was deprived of its feet by a curse from heaven for seducing mankind into idolatry. Notwithstanding, however, the surprise that has been occasioned by its singular movement, the motion of snails, though not so rapid, is in many respects as extraordinary: they adhere by a certain viscid secretion, on dry ground this secretion forms a pavement over which they glide; and they proceed by the action of muscles without bone, cartilage, or shell, to which these muscles can be attached.

No animal walks without legs or flies without wings (E); but there are many that swim without fins, and that leap and creep without any legs. The rapidity of movement is not proportioned to the number of instruments that are employed: if the spout-fish be observed to move slowly with one leg, the sea urchin moves still slower with many thousands; the oyster moves by squirting out water; the scallop by the jerk of its shell, and when in the water it rises to the surface and sails before the wind.

Many animals are formed by nature to fly, walk, leap, and swim: the fate of these is rather uncommon whose muscles or feet are by nature attached to their integuments; the lobster is obliged to throw off its shell, and the caterpillar all its feet with the skin, and in that situation to remain stationary till it receive new instruments of motion.

Whoever has read the celebrated work *De Motu Animalium*, needs not to be told that, besides the organs which are here mentioned, the form, the structure, and even the specific gravity of the body, as depending on the nature of the bones and muscles, or as varied by air, vesicles, and bubbles, with a great variety of other circumstances, are necessary to explain the different phenomena of locomotion.

As to vegetable motions, they evidently depend on external agents: The motion of the wild oat has been mentioned; the wings of seeds only fit them to be carried by the wind, their specific gravity to float in the water, and their legs or tentacula to adhere to bodies that are in motion; the singular motions which have been ascribed to sleeping, to waking, to sensation, and volition, in the vegetable kingdom, seem only the consequence of light, heat, moisture, and such stimulants, acting invisibly or with secret influence; the opening and closing of the meteoric flowers are always correspondent to the states of the atmosphere; and the opening and closing of the equinoctial and tropic flowers, to the light, the length, or shortness of the day.

The

Habit.
234
intention
of locomotion.
235
Habit;

The principal intentions of locomotion are to get food, to shun danger, to promote intercourse, and disperse the species.

SECT. X. *Habit.*

236
On vegeta-
bles;

HABIT here deviates a little from its usual meaning. We employ it to signify that principle in living bodies by which they accommodate themselves to circumstances, assume as it were a different nature, and in many respects undergo a species of transformation.

So very much do some individuals of the vegetable tribe accommodate themselves to different situations, to soil, to climate, and the state of cultivation, that those naturalists who have not been accustomed to nice and accurate discriminations, have frequently mistaken the variations of the same plant for so many species. These variations may be daily seen by examining the plant as it grows on the mountains, in the valleys, in the garden, or in the fields; or by bringing it from a rude uncultivated state, when it sometimes lays aside its formidable prickles, and changes the colour and structure of its flowers.

237
On the con-
stitution
and integu-
ments;

In the plant and animal, the delicacy and vigour of the constitution are oftener the effects of habit and circumstance than original conformation. We have mentioned already the varying colour of the integuments, and the purpose which it serves in changing with the seasons. We may here add, that animals covered with a down or hair have it thick or thin, long or short, according to the different exigencies of climate.

238
On man-
ners and
propensities;

Those changes produced on their body are accompanied with others which are the causes of new tastes, of new propensities, and new manners. At the Cape of Good Hope the ostrich inclines to sit on her eggs day and night like any other bird; but in Senegal, where the heat is great, she is somehow disposed to leave them to the sun during the day. In those countries where provisions can be found during the greatest part of the year, the bee gradually loses the propensity of laying up stores for the season of winter; and in "those countries infested with monkeys, many birds (says an amusing and instructive writer) which in other climates build in bushes and the clefts of trees, suspend their nests upon slender twigs, and by this ingenious device elude the rapacity of their enemies." Man, from imitation, is exposed to a great number of habits peculiar to himself; and physical causes have ingeniously been assigned for the variety of his features and complexion.

239
On man.

240
The extent
of its effects
unknown.

Few experiments have yet been instituted with a view to show how far this accommodating principle in

nature may be extended in the different species of plants and animals. It is known, however, that the lamb and the dove can be made carnivorous; and that the hawk, laying aside his ferocity, can be brought by art to live upon grain.

Habit.

Of all the effects of this singular principle, the most wonderful are those which are seen to take place with respect to generation. The fact is far from being new to the naturalist, that certain animals, oviparous at one season, are viviparous at another. This indicated much of accommodating power, though far inferior to what has been since witnessed and dissolved: for who from all this could suspect, that any animal which usually propagates by an intercourse of sexes, could in any circumstance accommodate so far as to multiply its species another way. Bonnet of Geneva, however, has discovered, that the puceron or vine fretter, which generally propagates by an intercourse of sexes, is not only oviparous at one period and viviparous at another, but in all cases where the union of the sexes is not to be obtained, can easily accomplish all the purposes of generation without it. Similar experiments have likewise proved, that many plants can bring to maturity a productive seed, though the male parts of the flower be destroyed before they can in the usual way have any impregnating effect on the female. In this case the conclusions drawn have been somewhat new. From these experiments it has been inferred, that the sexual system is ill-founded, and that most of the learned naturalists of Europe are on this subject labouring at present under a mistake. This reasoning, however, is not satisfactory: for why, it might be asked, in the vegetable kingdom more than in the animal, should the mode of generation be necessarily uniform? Tho' some plants may, like some animals, propagate without sexual distinctions, the conclusion is not logical that these distinctions are useless in all; and though some few may, in particular instances, propagate without that impregnation to which they were accustomed, will any one demonstrate, that accommodating nature does not here as in the puceron adopt a new method to accomplish her designs?

241
How far it
accommodates with
respect to
generation.

In all living bodies, it frequently happens that several characteristic distinctions, as the colour, the realising and sometimes propagated
tures, and a number of diseases that are originally the effects of circumstance, do at last become so fixed in the system, that they are afterwards transmitted to posterity through some generations (F). With regard to animals these facts are well known; and as to vegetables, it has been observed by a pupil of Linnaeus, that the apple trees which are sent from Britain to New England blossom at first too early for the climate, and

(F) Might not these facts reasonably claim the attention of those who mean to form matrimonial connections? How many might easily entail on their posterity hale constitutions, regular features, beautiful forms, sound minds, and tempers at once uniform and cheerful, who yet, from their sordid desire of wealth or their fond admiration of high rank, bequeath to them only scorbutic habits, deformed persons, disagreeable features, mean understandings, and forbidding tempers. Excepting the more extraordinary properties of body and mind, there are few that may not in some measure be transmitted to posterity: but nature seems unwilling that what is very eminent should ever be extended to a genus or a species; and therefore the sons of Cicero and Cromwell are only two of a thousand instances that might serve to prove, that neither extensive nor eccentric geniuses can be made hereditary: In the second generation they often degenerate into minds that are weak, satious, or deranged; or into minds that are chiefly remarkable by their oddities and whims.

Habit. and bear no fruit; and that it is only after some years that they conform to their situation: and this circumstance, by the way, explains why roots and seeds germinate sooner when brought from southern than when they are brought from northern latitudes. The very permanency of these effects has often been the cause of much confusion and error in philosophy: for the naturalist, mistaking the lasting though temporary qualities of habit for the real and essential qualities of species, has not unfrequently drawn conclusions from his experiments that have been contradicted by similar experiments in other circumstances. This is one of the obvious reasons why experiments exhibit so many inconsistencies and contradictions, and why we are amused with such a multitude of visionary theories about the properties of living bodies.

243
Render the
result of ex-
periments
conclusive,

244
And medi-
cal pre-
scriptions
often dan-
gerous.

245
Its origin;

246
Its design.

From not attending to the numerous circumstances that induce habits, and to that general accommodating principle in living bodies, many medical prescriptions are found to be not only useless but mischievous; and many parents, by studying the health and comfort of their children, bring on habits that prove the sources of perpetual sickness or the certain presages of an early death.

The accommodating principle is one of the consequences of irritability. Its various effects arise from the actions of different stimulants on the irritable fibre; and the after-duration of these effects, from the modifications of the irritable fibre, become habitual from the frequently repeated action of the stimulants.

The design of this accommodating principle is to fit both the plant and the animal for a more extensive and a more varied range of existence.

SECT. XI. Transformation.

247
Transformation

248
Not merely
a change of
temporary
envelopes.

249
In what it
consists, and
different
kinds of it.

MORE remarkably striking than any of those changes to which the plant and animal are exposed, from the variations of habit or the change of integuments, are those alterations which they undergo from metamorphosis or transformation. It has indeed been asserted, that these alterations consist in throwing off certain temporary coverings or envelopes: but there is here a want of precision in the ideas, and consequently a want of accuracy in the expression. The same persons who make this assertion inform us, that caterpillars change their skin, and many of them even several times, previous to the period of their transformation. Transformation, therefore, and a change of integuments, by their own concessions, are different things. The truth is, transformation frequently takes place independent of any change of integuments; and there is often a change of the integuments without transformation or any appearance of a new form: but a new form or change of appearance is always implied in metamorphosis or transformation. This new form is sometimes occasioned by a change of shape, consistency, and colour; as when the lobes of a seed are converted into seminal leaves. It is sometimes occasioned by a change of proportions among the parts: the proportions of a fœtus, every one sees, are different from those of a full grown man; and the painter, merely by observing the proportions, represents a child, a dwarf, and a giant, on the same scale. It is sometimes occasioned by the addition of new organs; as when the emmet receives wings, and the plume of the

seed is fed by new roots striking into the ground; or it is occasioned by a change of both the form and the organs, and their mode of operation, as happens remarkably in some insects: for though all living bodies, plants and animals without exception, undergo partial or general transformations, yet these changes are chiefly observable among insects. Many insects appear to consist of two distinct animal bodies one within the other: the exterior, a creature of an ugly form, residing in the water or under the earth, breathing by gills or sometimes by tracheæ projecting from the tail, possessing a voracious and groveling appetite, and having a system of sanguiferous vessels that circulates the blood towards the head. When all its parts decay and fall off, the creature inclosed succeeds in its stead: this often is an animal of a different form, generally lives in a different element, feeds on a different species of food, has different instruments of motion, different organs of sense, different organs of respiration, and differently situated; and being endowed with the parts of generation, inclines to gratify the sexual propensity, and produces an embryo which becomes like the first, and from which afterwards in process of time a creature is evolved similar to itself.

If the embryo or egg be deposited on a leaf, the leaf frequently is observed to bend, to wrap it in folds intended for the purpose, and to protect it from injuries and danger. If deposited in the body of an animal or plant, they accommodate themselves to its wants and necessities, and furnish a tumour which serves it for a nidus, and besides, like an uterus, supplies it with nourishment; and if deposited in the body of an insect, the creature provides for the future destination of its young charge with all the tender care of a parent, and then dies.

These circumstances, added to the great variety of forms which insects assume, render it sometimes difficult to know who is the parent. We cannot, for instance, pronounce with certainty who is the true parent of the gordius, known by the name of the *feta equina*, or hair eel. A set of experiments, which we once began with a view to throw some light on the subject, were interrupted unfortunately by an accident, and we have not since had leisure to resume them. We learned only, from a number of observations, that certain black beetles about the end of the summer months have the strongest propensity to run into the water, where they soon die; and that one or two, and sometimes three or more, of those eels gradually drop from the beetle by the anus. Whether other insects provide for the gordius in this manner we have not yet been able to determine.

The transformations of some animals are most observable in the uterus and egg. Some early transformations of the chick may be seen in the plate belonging to this article; and anatomy has often witnessed the change which happens at birth with respect to circulation, respiration, digestion, and the other functions.

If the reader wish to be much acquainted with the manners and transformations of insects, he will derive information and pleasure from consulting the plates and memoirs of Reaumur. If he wish to know their intimate structure, the laborious Swammerdam can introduce him to a new and amusing species of anatomy. This last author had before Reaumur defined and de-

Transfor-
mation.

250
Transfor-
mation of
insects.

251
Accommo-
dating prin-
ciple in
plants and
animals.

252
Difficult
sometimes
to know the
parents of
insects.

253
When
transfor-
mation is most
observable
in some ani-
mals.

254
Similar transformation in plants and animals.
255
Transformation accompanied with new propensities, &c.
256
Is an evolution of parts by nutrition.
257
The design of transformation.

scribed the kinds of transmutations among insects and some other animals. He has shown similar transmutations in plants; and in plate 46 of his Book of Nature, has compared the frog and the clove July-flower under their six different forms.

In all living bodies possessed of mind, the changes of form, as well as the change of habit and of age, are usually accompanied with new propensities, appetites, and passions. It may therefore be inferred, that we ought not to look for the cause of temper in either the brain or the nervous system; or to imagine, that the propensities, appetites, and passions, are properties of mind: they seem only affections happening to mind in consequence of stimuli and organic structure.

Microscopic observations having demonstrated, that all the forms of the plant and animal existed previously in the seed or embryo, transformation must be owing entirely to the evolution of the different parts by means of nutrition.

What nature intends by transformation, we pretend not to say; but by means of transformation different elements are peopled, the different seasons variously adorned, and animated nature wonderfully diversified without a multiplication of beings.

SECT. XII. Generation.

258
Generation.
259
One hypothesis, that all living bodies were formed at once, and brought into view by generation.

MANY of the causes which contribute to the formation of a living body have hitherto eluded human research; may in all probability never be discovered; and perhaps are beyond human comprehension. Some philosophers, considering the extreme divisibility of matter, and learning from the microscope that transformation is but the developement of certain parts that previously existed, have thence imagined that generation is somewhat analogous; that all regularly organised bodies received their form at the beginning; that the first of every genus and species contained by involution the numerous millions of succeeding generations; and that the union of the two sexes gives only a stimulus, and brings into view forms that had existed since the world began.

260
Object is to this hypothesis.

This hypothesis has attempted to explain a thing that is unknown by what must for ever remain incomprehensible to the human mind in its present state. It appeals absurdly from observation to conjecture; and supposes that bodies which are originally brought into view, which are daily augmented, frequently repaired, and sometimes renewed by organic action, do nevertheless in their first formation require an effort superior to what omnipotent power is able to perform by secondary agents.

261
Does not explain the renewal of parts.

Had the supporters of this hypothesis considered that many herbaceous plants produce new flowers when the first set are untimely cut off, that lobsters and many a species of insect renew their limbs, and that certain polypes can raise so perfect vegetable forms as to puzzle the naturalist whether or not he should class them under plants; they would not surely have prescribed such bounds to omniscient wisdom and almighty power, or declared with such confidence what the Author of Nature, to speak with the vulgar, must necessarily perform by his own hands, or what he may intrust to secondary causes regulated by his laws.

These philosophers will find it difficult to account in a very satisfactory manner for monstrous pro-

262
Nor the production of monstrous forms.
263
Procession of questionable data.

ductions, and for those changes of structure and of form which for a while continue hereditary from the influence of habit. They object to others, that all the parts of a living body are mutually dependent on one another, and that they must necessarily have been coeval or existed at once. But though every attempt that has yet been made to ascertain which of the vital organs are prior and which posterior in a living body has proved unsuccessful, it has not been demonstrated that either themselves or their functions are coeval. It may, on the contrary, be plainly demonstrated from observation, that the lungs and the stomach do not begin to perform their functions so early as the heart and the vascular system; that the heart and its system perform their functions, even with some considerable changes, immediately after birth; that the vegetable tribes are without nerves; and that brain and nerves in the animal kingdom perform more and more of their functions as the system approaches towards maturity. It has even been shown that bones will unite, and the limbs of an animal continue to be nourished without nerves; that there is a principle of life in the blood; that the heart will act under other stimuli besides that of nerves; and that sound logic does by no means require us to suppose that the first actions of the foetal heart, or the punctum saliens, are owing to the influence of stimuli from the brain, or that the brain must have existed when the heart first moved.

264
Embryo formed by secondary causes.

Although the minuteness and transparency of the parts may prevent us from seeing the first gradual formation of the embryo, yet every observation corroborates the opinion that it is formed by secondary causes, and through the medium of organic powers.

265
By one of the sexes or both.

It has been asked, whether or not is the embryo formed by the joint operation of the two sexes? or is it formed entirely by the one, and brought into action by a stimulus from the other? The former of these questions supposes that each of the sexes has a seminal fluid; that some mixture takes place in the uterus, and produces an embryo, in the same manner that a neutral salt assumes a certain and determinate form. The notion implies some general and confused idea of chemical combination; but does not bespeak a very clear head, profound reflection, or much acquaintance with the nature and properties of living bodies.

266
The opinion of Hippocrates, and Herophilus.

For a long time past the most rational physiologists have generally agreed that the embryo is formed gradually and slowly in one or other of the two sexes, not by chemical combination and mixture, but by a system of organs, directed by laws and prompted by stimuli, with many of which we are yet unacquainted. From the great Hippocrates downwards to Aquepandens and Harvey, the credit of furnishing the foetal embryo was almost universally given to the females of those animals which are named oviparous. Among the viviparous, appearances were such, that the female was left to contend it with the male. At last the credit of Leeuwenhoek's discoveries seemed to put an end to all doubts entertained upon the subject. He very plainly saw through his microscope that very great profusion of particles that move to and fro with amazing rapidity in the male semen. Upon this he embraced the doctrine of Hanne, who had seen them before, and supposed from their motions that these particles were not only animalcules, but the principles or rudiments

Generation
268
Objections
to this last
opinion.

rudiments of that animal in whom they were formed, and that they were deposited in the uterus of the female only to be nourished and augmented in size.

What raised suspicions against this theory were the numerous animalcules discoverable by the microscope in other fluids, and that vast profusion of young embryos in those cases where never more than one or two arrive at maturity. It was an objection to it, that some females had been impregnated where the hymen remained unbroken, and where the vulva had been shut so closely as to leave only a passage for the urine. The male semen in these instances could have reached only the mouth of the uterus. It was another*, that in all birds which have no intrant penis the male semen is never sent farther than the mouth of the vulva, and that a single act of the male impregnates the whole eggs of the ovarium. A third objection is the pollen of flowers, which is not applied immediately to the seed, but often to a distant part of the vessel in which it is contained. A fourth may be taken from frogs and fishes, and all those animals whose eggs are impregnated after emission. And, lastly, Haller had observed the pullet completely formed in those eggs that were not fecundated.

* Vid.
Flaro. de
Partu.

269
The former
opinion bet-
ter support-
ed.

Supposing animalcules in every kind of prolific semen, yet it frequently happens that this semen undergoes a change before it can be applied to the embryo. The semen of the frog is dissolved in water; and that which is injected disappearing suddenly after coition, would seem to intimate, that in those animals which have been examined it had met with a solvent somewhere in the uterus, and produced its effect after the change. It is now, we believe, pretty generally known, that the embryo does not commence its existence in the cavity of the uterus. De Graaf observed it on its passage down the Fallopian tube; he saw the place where it first began in the testicle of the female; and cases have occurred where it has missed the Fallopian tube, where it has fallen into the abdomen, where the placenta has been formed, and the fœtus has grown among the viscera of the lower belly.

270
More gene-
rally adopt-
ed.

From these facts it has been concluded, notwithstanding some feeble objections, that the female testicles are real ovaries containing eggs; that these eggs are brought into action by the stimulating power of the male semen, which is sometimes thrown into the cavity of the uterus, sometimes applied only to its mouth, and sometimes sprinkled over the egg after emission.

271
Difference
between
oviparous
and vivipa-
rous ani-
mals and
plants.

The principal difference, therefore, that occurs between oviparous and viviparous animals, considered as such, appears to be this: the former are accustomed to eject their embryo before it escapes from the membranes of the egg; the latter retain it long in the uterus until it acquires a considerable size, until the membranes can hold it no longer, and then eject it when the membranes

are burst. A plant is oviparous when it yields seed; viviparous when it produces a gem, a bud, a bulb, or an eyed root. The membranes of the seed being removed, an incipient embryo is seen through the microscope.

Some animals, according to the season, eject the embryo inclosed in its membranes, or retain it in the uterus till the membranes are broken. These are the animals which are said to be oviparous at one period and viviparous at another. The spider-flies retain their young till they be as large as the natural size of their own bodies, and have undergone all their transformations within the expansile membranes of the egg, and an uterus as expansile as the stomach of a serpent.

In most cases generation requires a temporary union of two sexes: but it has been said, that in Senegal there is a species of shell-fish among whom this operation is the joint work of three individuals. In our own country, too, three frogs are frequently observed adhering together, though the labours of the third have generally been thought more officious than necessary. In some animals the sexual union is almost instantaneous. It constitutes nearly the business of life in the last stage of the ephemeron; and the male both of the frog and toad often continues on the back of the female not for hours and for days only but for some weeks. Upon examination it has been found, that with his fore-feet he assists the female to protrude her eggs through the windings of the oviduct; and when they at last arrive at the anus, a species of the toad has been observed to draw them out with his hind legs. These animals were probably the first of the masculine gender who practised this art. But due honour has not been ascribed to the discoverers. In former days, the generous and grateful spirit of the ancients made them ready to acknowledge their obligations to different animals for the arts of bleeding, clystering, and purging; but such is the degeneracy of modern times, that many write only to claim the discoveries of others. On this account we ought not to wonder that many accoucheurs, in publishing encomiums on their own merit, have invidiously concealed the superior pretensions of the obstetrical toad.

Among all living bodies the two sexes are generally similar; and the male sex generally distinguished by superior strength, beauty, and courage. The law, however, does not hold universally. The females of some carnivorous animals, who are left by the male to provide for their offspring, are larger, stronger, and more ferocious than he. Among some insects the male and female have no similarity even in form. The male of the glow-worm is a beetle, which flies in the dark, and is attracted not by the form, but the brilliancy of his mistress (c). The female gall insect is a large mass like a vegetable

Genera-
tion.

272
Some ani-
mals ovipa-
rous and vi-
viparous.

273
Union of
the sexes.

274
Different
appearance
of the two
sexes.

(c) Such glowing beauty allures enemies as well as lovers. "In Jamaica, in some seasons of the year, (says Dr Darwin), the fire-flies are seen in the evenings in great abundance. When they settle on the ground, the bull-frog greedily devours them; which seems to have given origin to a curious, though cruel, method of destroying these animals: If red-hot pieces of charcoal be thrown towards them in the dusk of the evening, they leap at them, and, hastily swallowing them, are burnt to death." *Botanic Garden*. From this fact the romantic moralist and spiritualizer might derive some hints for amusing declamation; and in their dissuaves might plausibly demonstrate, that in most cases beauty is fatal to the object beloved, to the lover, and destroyer.

Genera-
tion.

275
Male and
female
parts of
animals.

276
Their situa-
tion.

277
Androgyn-
ous ani-
mals.

278
Swam-
merd. *Hist.*
of *Insects*,
p. 1. ch. 9.

278
Male and
female
parts of ve-
getables.

279
Parts of ge-
neration
change, and
sometimes
disappear.

vegetable excrecence, without locomotion; the male a small fly full of activity. The one is as unlike to the other as a Harpy to a Venus, and as disproportioned in point of bulk as a horse to an elephant.

In many animals the distinctions of sex are concealed in the body. When any of their parts are placed externally, or protruded occasionally, the male parts are usually prominent, and the female hollow, in order to receive them. In the acari, however, in many flies, and a few hornets, the case is reversed; the female parts suffer erection, and the male parts are open and hollow for their reception.

The external situation of these parts is very much varied in different animals. In many worms it is near to the head. It is often upon the side of the snail; near to the breast in the female of the dragon-fly. It is at the extremity of the antennæ in the male spider. The vulva enters from the rectum in birds. Its common situation in most animals is well known.—The male penis, where there is one, is sometimes found to enter the vulva, and sometimes not: it is sometimes imperforated, sometimes forked, sometimes double, sometimes fleshy, sometimes bony, sometimes straight, sometimes winding spirally like a screw, sometimes with a knob and sometimes with a point at its extremity, according to the kinds and varieties of animals.

Few individuals have more than one sex. Many snails, however, are androgynous, and have two. In copulation they perform the office of two sexes, and are mutually impregnated†. This circumstance has often led the sensualist to wish that he were a snail. With equal reason the Epicure might wish to be one of those worms that imbibe by absorbents, and suck in nourishment by a thousand mouths. The organs employed may be more in number, the continuance of their function may be much longer, and yet the gratification may be less. The discreet beauty can afford a million of pleasures to her lover which no snail or sensualist enjoys, and which prostitution can never yield.

The male and female parts of the vegetable are sometimes both on the same flower, sometimes on separate flowers, and sometimes even on different plants of the same species. Besides the flower, another organ of generation is found in vegetables. This is the corona, from which the buds and branches proceed. It is a substance between the pith and the ligneous circles, and from which the diametral insertments diverge.

The corona is most conspicuous at the time when it sends forth shoots. The flower comes forth only at the time when the seed is to be formed; and the testicles and ovaries of those animals which procreate only at stated periods are diminished in size, and sometimes disappear, till the genial season. Even some females, when they cease to be prolific, as the pheasant, for instance, assume many marks of the other sex, as if their former sex had been assumed only for a while, and to answer some temporary purpose.

In all animals the incipient embryos are perhaps neuters, and the sex determined according to the predominancy of the male or female stimulus on the parts. It would not a little confirm this opinion, were the ob-

servation to be well founded, that certain bulls are very apt to beget males and others females, and that certain cows which have females always when they are young bring forth males when they grow old. The different proportions of males and females in different climates might also serve to illustrate this doctrine. It is no objection to it that the order of male and female births in the same family is often irregular. The proportional force of the two stimuli will naturally be different at different times. It may depend on the quantity or quality of the fluid secreted, upon the difference of ardour in the parties, on the fancy, the passions, the particular state of the system at the time, and a thousand circumstances, besides the age, and the usual or general habit of the body. We mean only to infer at present, that wherever a male or female is produced, the stimulus of that particular sex, whatever was the cause, had during the time of coition and conception acquired the ascendancy over the parts that were to become sexual in the embryo. We cannot so readily answer the question, Why the offspring should possess the form and dispositions of one parent, and the sex of the other? In this case the different stimuli may have acted differently on different parts; in the case of hermaphrodites, which are very common in the horse, the ass, the cow, and the sheep, the two parents seem to divide the form, the sex, and the dispositions, equally between them.

The particular cause which excites the orgasmus in the female organs is not ascertained. That viscous fluid which young lascivious females eject when fond of the male, is chiefly a secretion from the glands of the vagina, the mouth of the uterus, and the neighbouring parts. In some respects it appears to be similar to those periodical discharges of females which frequently assume the erect posture; and these discharges being usually discontinued during the times of pregnancy and suckling, we must suppose that it is a portion of that fluid which nature has prepared for the use of the fœtus. These discharges are always a proof that the female has arrived at the age of puberty; that her ovary is now performing its office; and that she is disposed to propagate her kind. Whatever be the cause of the female orgasmus, it is often so strong as to counteract the natural effects of the seminal fluid, and prevent impregnation. For this reason, few young and lascivious females conceive immediately after their marriage; and after coition, therefore, in cattle, it is sometimes a practice to beat the female, to plunge her in water, to weary her with running, and to use other means to prevent the return of the sexual desire.

In man, and some of the nobler animals, the influence of fancy over the organs of generation is unquestionably great; but the extent and mode of its agency is not defined. Those who allow it so much power in impressing marks, and altering the form and colour of the fœtus, support their opinion rather by the number than the strength of their arguments. Many of the stories which they adduce as a sort of proofs are evidently fabulous, and have brought the truth of the whole into question. The reports, however, of the French commissioners who were appointed to examine the nature of animal magnetism, ought to deter the can-

Genera-
tion.

280
Incipient
embryos
perhaps
neutera.

281
Female or-
gasmus.

282
Influence of
fancy over
the parts of
generation.

Genera-
tion

did inquirer from drawing very hasty conclusions.— The queries of Fienus (H) concerning the powers of this mental faculty are important and curious, and might be of use in directing our researches; but they ought to be answered by accurate experiments, and not by acute metaphysical reasoning and historical anecdotes that are ill authenticated.

283
The mixture of
sexes prevented,
how.

To prevent a confusion of genera and species, animals are generally restricted by propensity to their own kind; and the seminal fluids, besides, being various in various animals, they cannot indiscriminately act as a stimulus on all female organs of generation. The changes of form induced by habit, which is owing itself to the influence of stimuli, will partly explain the manner in which the progeny is made to resemble the male. As the irritability of different parts is of different kinds, the stimulus will have a different effect on different organs: and in these cases where either genera or species are mixed, the parts which are most and least affected by the stimulus of the male will be obvious in the shape and form of the offspring.

284
Generation
without
sexual distinctions in
plants and
animals.

We have hitherto spoken of generation as being performed by the temporary intercourse of two sexes; but the puceron is an instance where sexual distinctions are not always necessary. Even where they exist they are daily dispensed with in the vegetable kingdom. Plants grow from the gem, the bulb, the leaf, or the root.— They propagate by slips, by suckers, and by layers, and some of them multiply by spontaneous separation (1). In many animals the distinctions of sex are totally unknown. It has been observed, that infusory animalcules multiply their species by continual divisions and subdivisions of their own body; that some polypes, by spontaneous separation, split transversely,

some longitudinally, and that some send off shoots. When experiments have been made upon these animals, it has been discovered that the numerous and artificial divisions of their body or their head produce entire animals. Trembley learned that they might be engrafted upon one another, and produce monsters as wild and extravagant as poet or faunlike has ever dreamed of.

Genera-
tion.

It was noticed already that the alimentary canal of some animals distributed nourishment through the whole body without the intervention of circulating vessels, and that the vital organs of vegetables were generally diffused through the whole system. The case is the same in polypes as in plants. Every part is a miniature of the whole. It is found to have similar organs of digestion, of respiration, of circulation, and of generation. In perfect animals all the parts are more dependent on one another: the vital organs have distinct situations, and their powers are concentrated in distinct places. The arm of a man has no heart; it has no lungs; it has no stomach, and no organs of generation; but the branch of a tree has as complete a system of organs as the trunk itself, and is as independent of that body from which it grew as the graft is independent of the stock.

285
Plants and
some animals—a con-
geries of
living bod-
ies.

The several parts of perfect animals all contribute to make one whole; the several parts of a plant or polype, when united together, form only a congeries of living bodies. These facts contribute to explain the principal phenomena in this mode of propagation.

286
Difference
between
plants and
the perfect
animals.

SECT. XIII. Sleep.

SLEEP is rather an affection of mind than a property of body, and is therefore more naturally a subject of metaphysics

287
Sleep.

(H) The small work of Fienus to which we allude is intitled *De Viribus Imaginationis Tractatus*. The following questions serve to give an idea of its contents, and are named *Index Questionum hujus Libri*.

Quæstio. I. An anima habeat vim agendi in ullum corpus?

II. In quæ corpora agere possit, et qua actione?

III. Per quas potentias illos motus et actiones exercent?

IV. An anima agat aliquid per potentiam imaginativam?

V. An phantasia possit ullum corpus movere localiter?

VI. An possit alterare?

VII. An phantasia possit vim ullam acquirere ab influxu cælorum?

VIII. An ergo phantasia nullam habeat vim agendi?

IX. Per quas potentias phantasia corpora immutat?

X. Quid possit in corpus proprium, et specialiter, an possit in eo creare morbos?

XI. An possit morbos creare?

XII. Quid possit in alienum externum?

XIII. Quid possit in alienum propinquum seu fœtum?

XIV. Quomodo et qua ratione fœtum immutat?

XV. Quomodo possit conformatricem dirigere?

XVI. Quænam imaginatio habeat illam signandi potestatem? quæ non?

XVII. Cur non omnis imaginatio quam animi passiones sequuntur signat?

XVIII. An omne animi passiones signant?

XIX. Quænam imaginatio signet, an tantum matris an etiam patris?

XX. An etiam fructuum imaginatio signet?

XXI. Quo tempore signet, an tantum graviditatis, an etiam conceptus?

XXII. Quantum permutationem possit in fœtum inducere, et quas signaturas possit causare?

XXIII. Cur phantasia non semper imprimit in fœtum res imaginatas eodem modo, sed sæpe tam diversis?

XXIV. Cur non eidem semper parti sed diversis notæ inducuntur?

(1) As the house leek and some grasses.

Sleep. metaphysics than of physiology. This affection is often induced by fatigue and exercise; and several persons, when they are weary and no longer able to move their limbs, say they are exhausted. Though the word *exhausted*, in this expression, has seldom any precise meaning, it seems, however, to have been the means of suggesting a theory with regard to sleep. This theory supposes that sleep is occasioned by the exhaustion of irritability in the living system; but it seems to be founded on very limited and partial observations, or rather has been formed, like a great many others, prior to any observations at all, and afterwards tortured to account for facts which it does not comprehend. It does not account for the periodical returns of sleep, for the almost unremitting drowsiness of infants, and for that listless lethargic inaction so often attendant on old age. When no exhaustion of irritability can well be supposed to have taken place, the propensity to sleep on many occasions becomes irresistible, from the effects of monotonous speaking, from stillness, darkness, or from the sameness of scenery around us; and when one stimulus, after long application, can rouse no more (a plain proof that the irritable principle is by no means exhausted), another stimulus that is less powerful in ordinary cases is accompanied with excitement.

288 An affection of mind.
289 Favour nutrition.
Of these phenomena, we frankly confess that we can assign no physical cause that is satisfactory. It is easy, however, to see the intention which nature has in view by inducing sleep. It has long been observed, that in all living bodies there is a continual waste and repair, or, to speak with more precision and accuracy, one process of assimilation and another of dissolution constantly taking place in all the different parts of the system. It is also true that this assimilation, when the body is healthy, predominates in youth; that dissolution prevails in old age; and that the two are nearly on a par during the vigour and meridian of life. Another fact which admits of demonstration, is, that a gentle and moderate exertion of mind and body will promote both. And lastly, it is certain that immoderate exertion in either respect, or any exertion that is not suited to our strength, habits, or period of life, prevents assimilation, hastens dissolution; and that the means which nature employs to restore the balance is usually by inducing a state of sleep.

290 Sleeping and waking each suited to different functions in the system.
When the balance is restored, and all the parts are again repaired for discharging their office, man awakes; but his waking period is of short duration. If appetite or passion do not engage him in some pursuit, if his mind be not occupied with some object, or if no stimuli be applied from without. This period seems chiefly intended for collecting food, and for being employed in those exertions which promote respiration, digestion, absorption, circulation, and secretion; while sleep, after the food is collected, assists nutrition, and promotes assimilation throughout the system. If what is the natural food of the species cannot be collected by the plant or animal in a short time, the period of sleep is proportionally restricted. If the food received be difficultly assimilated, the period of sleep is proportionally extended. If the food be not prepared for assimilation, the sleep is disturbed. If it be, difficultly prepared by the organs, the active exertions are more vigorous; if easily prepared, they are more feeble. If

Sleep. it be collected during the day, the sleep is in the night; if collected in the night, the sleep takes place during the day; and all living bodies are directed by nature to select that time and species of food which is most suited to their nature, their habits, their circumstances, and age.

291 Violent exertions of mind or body hurtful to the system.
To favour nutrition, not only the body, but even the mind, must be allowed to indulge in rest. The child sleeps, and his mental faculties are under restraint, that those functions employed in nutrition may not be disturbed. The mental faculties are still feeble in a more advanced period of life; and the moderate exertions of mind and body which are natural to youth are chiefly such as favour the preparatory organs of the system, and promote growth: but the active and vigorous exertions of manhood, considered with respect to mind or to body, soon cause dissolution to preponderate in the scale, and old age becomes listless, inactive, and drowsy, and the mind returns to childhood or dotage, because living bodies are known to accommodate themselves to circumstances, and because the prevailing dissolution is retarded by the frequent returns of rest and of sleep, which favour so much the assimilating powers, counteract *re-absorption*, and oppose decay.

292 Motion exertion counteracts nutrition.
During sleep the irritable principle is more languid, and all the senses are more obtuse. The mind then is withdrawn to its rest, and does not attend to stimuli from without. The same happens when the mind is absorbed in profound thought: but profound thought is hurtful to the system. The mind then is engaged in pursuits peculiarly its own, and is less attentive to the calls of nature. In the time of sleep it withdraws seemingly, not so much for its own sake as that of the body, which then being freed from the interruption of voluntary motions, all those organs which act spontaneously can more easily discharge their functions.

293 Character of the system not controlled by the mind, therefore.
For the best of reasons, the mind is not allowed to judge for itself when it is proper to eat, to drink, to sleep, to wake, and to propagate the species. These and the like are offices too important to be wholly intrusted with a being of so very limited intelligence. In all these cases, it is therefore directed by certain propensities resulting from the body in consequence of stimuli or organic structure. Being often amused with thoughts and ideas on those objects which are purely intellectual, as the notes of memory, the forms of fancy, and its own operations in the way of reasoning; being intrusted with some little power in rousing, calming, and regulating the passions, the desires, and appetites; and having the command of all the voluntary movements of the body; it sometimes neglects its charge of the system, destroys it sometimes by excessive indulgence, and sometimes employs it in accomplishing ends peculiarly its own. One should imagine that the mental principle in the lower animals should occasion but little disturbance to the system; yet it has been observed that geese fatten sooner in the dark than they do in light, where the mind is entertained with varieties of objects: and this circumstance will partly explain why man does not fatten so regularly as the brute, and why castration, which prevents so much anxiety and passion and exhausting efforts, assists growth and the organs of nutrition. The venereal stimulus, for this reason, is not strongly felt at a very early period of youth, nor is very troublesome in old age. In the former case it would

²⁹³ Sleep. would prevent the growth of the system; in the latter it would hasten its dissolution.

²⁹⁴ The system accommodates with respect to sleep. The natural returns of waking and sleeping may be altered by the presence or absence of stimuli, and are curiously affected by the influence of habit. Although the commencement of one of these periods happen to be changed, the commencement of the other will continue as before. If a person be accustomed to sleep precisely at nine in the evening, and to rise again at six in the morning, though his sleep in the evening may now and then be kept off till twelve, he will waken at six; and though continued by darkness, quietness, or such like causes, till the day be advanced, it will recommence in the evening at nine. The state of physiology is such at present that we cannot assign any precise physical cause for the natural kinds of sleeping and waking, or for their regular periods of return. As for the causes which occasion morbid sleeping and waking, we refer our readers to books on pathology.

²⁹⁵ Sleep of plants. Plants too have been said to sleep. At the approach of night, many of them are observed to change their appearances very considerably, and sometimes even to such a degree as scarcely to be known for what they were before. These changes happen principally to the leaves and the flowers. During the night, many leaves, according to the nature and genus of the plant, are seen to rise up, to hang down, or to fold themselves in various ways for the protection of the flowers, the buds, the fruits, or young stems; and many flowers, to escape a superabundance of moisture, to hang down their mouths towards the earth, or wrap themselves up in their calices. It was mentioned already, that these phenomena are owing to stimuli acting from without: we may add here, that most of the motions are performed at the joints where the leaves and petals articulate with the stem. A period of rest is as necessary to plants as sleep is to animals. The irritable principle cannot act long under the influence of the same stimulant, except at intervals; and the rapid growth observable in plants during the night, is a strong proof that the organs employed in assimilation had been disturbed in discharging their functions during the day, when exposed to the actions of heat and light and of other stimulants.

SECT. XIV. *Death.*

²⁹⁶ Death. DEATH is the cessation and total absence of the living principle in organized bodies. It is sometimes imitated by sleep and swoons; and a state of torpor in many instances can hardly be distinguished from it. Several mosses and a few animals, as the ears of blight-

ed wheat, the seta equina, the wheel polype, and some snails as we learn from the Philosophical Transactions, may be safely preserved as dried preparations, not for months only but for years; and after irritability and sensation have been totally suspended, will return to life upon the proper application of moisture. A wheel polype was put by Fontana upon a bit of glass, and exposed during the whole summer to the noonday sun; another was exposed in a similar manner for a year and a half; and after they were like a piece of hardened glue, were restored to the use of all their functions by a few drops of water (κ). Wherever there is death, there must therefore be likewise a partial or general decomposition of one or more of the vital organs. This decomposition takes place naturally in some living bodies after a few hours, in some after a few days; the life of others is extended to weeks; some are vigorous for months or a season. Man has often seen more than fourscore; and the hardy oak survives the shock of two or three centuries. These observations conspire to show that there is a certain period of existence allotted by nature to every species of living bodies. In the individual this period is sometimes abridged, and may be sometimes extended by circumstances; but yet there is a bound which it cannot pass, when the vital organs must be decomposed, and the system return to moulder with the dust. The time of incubation and the time of gestation are pretty much defined in every species, because the circumstances of the individual in these cases are generally similar; but after emerging from the fetal state, the individuals are partly entrusted to their own organs and the chances of life, which are much varied; and hence we account for the difference of their age.

Life in general seems to be proportioned to the space occupied by that series of functions which the species is evidently destined to perform: and here sometimes the accommodating principle is singularly remarkable. As the period of decay is never seen to commence in the species till that of propagation be nearly elapsed, and as propagation in the lower tribes of plants and of animals is often the immediate harbinger of death; so many animals which have not propagated, indulged the propensity, nor became uneasy from the languor of desire, continue vigorous longer than ordinary, as if it were waiting for an opportunity to multiply their kind. And in the vegetable kingdom, where no individual is ever the victim of desire or passion, annuals, if prevented from flowering and seeding in their proper season, will live double, and sometimes triple, the usual time, till these functions be

(κ) Father Gumillo a Jesuit, and the Indians of Peru, says Dr Fowler, are quoted by Fontana, on the authority of Bouguer, as speaking of a large and venomous snake, which being dead and dried in the open air or in the smoke of a chimney, has the property of coming again to life on its being exposed for some days to the sun in stagnant and corrupted water. But, adds the Doctor, it would almost require the credulity of an Indian to credit the testimony of the Jesuit. *Experiments and Observations relative to Animal Electricity, by Richard Fowler.*—With regard to this report, we shall only observe, that the snake would not readily return to life after it was dead: but if the Jesuit meant only that it recovered after it was dried, and its several functions had been suspended, we must say, that if his report be not sufficiently authenticated, neither has it been sufficiently disproved.

Death. Be somehow performed, and then die. But when all the organs are fully evolved and have discharged, or have continued for the usual time capable of discharging, those offices for which they were intended; dissolution commences, the assimilating organs begin gradually to lose their tone, and the reabsorbents carry off more from the different parts than what they receive in the way of nutrition: the irritable fibre then becomes rigid; the membranes and cartilages begin to ossify; the bones grow harder; the smaller vessels collapse and disappear; the parts no longer are obedient, as before, to the action of stimulants; and death ensues.

Some, in order to account for this event, imagine that the body receives at first a certain portion of irritabi-

lity, and continues to live till that be exhausted: but this theory explains nothing; and without pretending to a great deal of foresight, we will venture to predict, that for all the irritability which it has, it will not be distinguished for its longevity.

With regard to the periods by which the life, the functions, and diseases of living bodies are so frequently regulated, and which periods may sometimes be varied but not evaded, the most prudent language that, perhaps, can be adopted in the present state of physiological science is this of the Divine, That the God who formed us hath numbered our days, determined our times, and prescribed the limits of our existence.

The following TABLE may be considered as in some respect a summary view of the foregoing Sections, and as a Supplement to the Table of D'Azyr.

| | | |
|-----------------|--|---|
| 1. RESPIRATION. | Some living bodies have respiratory organs (L) | Diffused through the system. |
| | | Confined to one place. |
| | | Situated externally. |
| | | Situated internally. |
| | | In the course of circulation. |
| | | Not in the course of circulation. |
| | | Within or without the course of circulation at pleasure. |
| | | Without tracheæ (M). |
| | | With tracheæ ramified through the system where the respiratory organs are generally diffused. |
| | | _____ not ramified through the system where the respiratory organs are confined. |
| | | _____ formed by rings. |
| | | _____ by segments of rings on one side, and a membrane on the other. |
| | | _____ by continuous rings running spirally like a screw. |
| | | _____ admitting air by one entrance. |
| | | _____ by several entrances. |
| | | _____ wholly concealed in the body. |
| | | _____ partly projecting from the body. |
| | | _____ opening at the head. |
| | | _____ at the opposite extremity. |
| | | _____ upon one side. |
| | | _____ upon both sides. |
| 2. DIGESTION. | Some living bodies have an alimentary canal | Without teeth. |
| | | With teeth in the mouth. |
| | | _____ in the stomach. |
| | | _____ stones or artificial teeth in the stomach. |
| | | _____ glands in the mouth for secreting a liquor to be mixed with the food. |
| | | _____ pouches in the mouth where the food is kept and moistened. |
| | | _____ a sac or bag where the food is kept and moistened. |
| | | _____ a membranous stomach. |
| | | _____ a muscular stomach. |
| | | _____ an intermediate stomach. |
| | | Without a cœcum or blind gut. |
| | | With a cœcum. |
| | | _____ two cœca. } These parts, as well as |
| | | _____ three cœca. } ruminating stomachs and |
| | | _____ four cœca. } their œsophagus, have an- |
| | | _____ one entrance or mouth. } tiperistaltic motions. |
| | | _____ many entrances by absorbents. |

Plants

(L) The gentlemen of the French Academy, who have been attentive to mark the number of lobes in the lungs and livers of different animals, have sufficiently demonstrated, by the facts which they relate, that many of those physiological conclusions which have been drawn from the number of lobes in these two viscera, are just as delusive as many of those which have been drawn from the number of lobes and the different tubercles found in the brain.

(M) Where the respiratory organs are situated externally.

DIGESTION. } Plants have many alimentary canals (N).
 } Some polypes have alimentary canals that branch through the body.
 } The alimentary canals of plants, of some polypes, and worms, distribute the fluids without the aid of a circulating system.

3. ABSORPTION. } Performed { By vessels beginning from the alimentary canal.
 } { _____ from the cavities.
 } { _____ from the surface.
 } { — veins in the penis and placenta.
 } { — reabsorbents originating from all the parts of the system.

4. CIRCULATION. } Some living bodies have { No circulating system.
 } { A circulating system with one heart.
 } { _____ a heart for distributing the blood through the respiratory organs, and an artery for distributing it through the system.
 } { _____ one heart for the respiratory organs, and one for the system, both in one capsule.
 } { _____ two hearts for the respiratory organs, and one for the system.
 } { _____ a pulmonary heart, or a heart for the respiratory organs in the course of circulation.
 } { _____ a pulmonary heart within or without the course of circulation pleasure.
 } { _____ a heart situated in the breast.
 } { _____ near to the head.
 } { _____ in the opposite extremity.

5. NUTRITION. } The food is prepared { By the alimentary canal.
 } { — the lacteals.
 } { — the respiratory organs.
 } { — the circulating system.
 } { — the cellular membrane.
 } { — glands.
 } { And by the several parts in which it becomes finally assimilated.

6. SECRETION. } Performed { By vessels.
 } { — exhaling vessels.
 } { — excretory organs.
 } { — organic pores.
 } { — glands.
 } { And by all the parts of which the system is composed.

7. INTEGUMENTATION (O). } Some living bodies have integuments { Which are scaly.
 } { _____ shelly.
 } { _____ membranous.
 } { _____ corneous.
 } { _____ cretaceous.
 } { _____ ligneous.
 } { _____ covered with down.
 } { _____ hair.
 } { _____ prickles.
 } { _____ feathers.
 } { _____ a viscid matter.
 } { _____ change their colour.
 } { _____ their covering.
 } { _____ are changed themselves.

8. IARRI.

(N) The subterraneous bulbs, the swollen fleshy parts of the roots, and certain cups and vesicles which contain water, serve often as reservoirs of food to the plant, although for various reasons we have not ventured to call them stomachs. *Stomach* would be a vague and unmeaning word were it applied even to all those reservoirs of water or secreted fluids which we find in fishes, and by which some of these animals are preserved alive on the dry shore till the tide return.

(O) There seems to be a want of precision in classing bones with integuments, or integuments with bones, as

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| 8. IRRITABILITY. | The irritable principle effected | By stimulants invisible. |
| | | — unknown. |
| | | — unthought of. |
| | | — the nervous influence. |
| | | — light. |
| | | — heat. |
| | | — moisture. |
| | | — electricity. |
| | | — salts. |
| | | — gases. |
| | | — bodies that act mechanically. |

| | | |
|------------|----------------------|---|
| 9. MOTION. | Locomotion performed | By legs. |
| | | — wings. |
| | | — fins. |
| | | — the tail. |
| | | — organs which fall not properly under these descriptions. |
| | | — the springiness of the body or of some part of it. |
| | | — contrivances which fit living bodies for being moved by foreign agents (p). |

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4 Y

10. HABIT.

is done in D'Azyr's table. Comparatively speaking, bones are confined to a few genera of living bodies, and are never subject to periodical changes like the integuments or cuticular coat of the alimentary canal in some animals.

For the sake of perspicuity, it could have been wished that either anatomists or physiologists had defined bones in a manner different from what they have done, and as far as possible avoided those loose and inaccurate expressions which disgrace science; for some speak of animals having their bones, by which they mean shells on their outside, and the muscles within them. Some speak of solid and compact bones that were once cartilages, membranes, nay a mere jelly; and some speak of bones in general as the hardest, most solid, and most inflexible parts of the organized body. From all this we are led to infer, that integuments, if hard, solid, and inflexible, may be called bones; that the heart and blood vessels, if converted into a hard, solid, and inflexible substance, may be called bones; and that a jelly, a membrane, or a cartilage, if it can be supposed that in the course of nature they will become hard, solid, and inflexible, may likewise be called bones. But certainly if hardness, solidity, and inflexibility, be to constitute the characteristics of bones in a living body, however often we may be necessitated to include shells, wood, horns, and stony concretions, under that denomination, we can never with propriety speak of bones that are cartilaginous, membranous, or even a mere jelly. These expressions might be proper enough were ossification considered merely as a natural or accidental circumstance, and were bones defined to be those internal parts of an animal which are intended by nature to form what is meant by the skeleton in its usual sense. These parts, we know, after passing through the forms of jellies, membranes, and cartilages, often become hard, solid, and inflexible, from ossification; a species of induration which is natural to the parts which form the skeleton of some animals, an induration which occasionally is extended to other parts, which sometimes exhibits the appearance of crystallization, and in many respects is different from the manner in which the wood of vegetables and the shells of animals become hard.

Ossification does not interfere so much as may be commonly imagined with the structure of bones: the structure of bodies may often be similar, and yet their mode of induration be different. Bones have been observed to consist of laminae, or plates like shells, and cylindric bones of concentric circles like wood. The concentric circles of wood have been found to consist of indurated membranes, which they receive successively from the bark; and Swammerdam discovered that the shells of some fishes were composed of laminae that consisted likewise of indurated membranes, or hardened cuticles, that had been successively turned by the body. It has thence been supposed that bones, though hardened in a different manner, are of a structure nearly similar to that of some ligneous bodies and shells, and that their laminae in many instances consist also of indurated membranes, supplied successively by the periosteum when it is present. When it is absent, nature, which accommodates herself to circumstances, can form the bone in another way, and afterwards cover her new productions with a periosteum. For many excellent physiological observations on bones, we refer our readers to the *Osteology* of the late Dr. Monro, and particularly to the volume already published of Mr. Bell's *System of Anatomy*.

(p) The pulp which surrounds seeds is often the means of their propagation. Animals swallow the seeds for the sake of the pulp; and the seeds remaining indigestible, are carried to a distance, and discharged with the feces.

| | | |
|--------------------|--|--|
| 10. HABIT | Accommodates with respect | <ul style="list-style-type: none"> To respiration. — digestion. — absorption. — circulation. — nutrition. — secretion. — integumentation. — irritability. — motion. — transformation. — generation. — sleep. — death. — form. — size. — climate. — propensity. — the healing of parts that are morbid. — the renewal of those that are broken off. |
| 11. TRANSFORMATION | Takes place | <ul style="list-style-type: none"> By a change of proportion among the parts. — of their form. — throwing off old parts. — an addition of new ones of a different use, structure, and form. — a change of the whole form together. — of qualities, propensities, manners. |
| 12. GENERATION. | Performed | <ul style="list-style-type: none"> By the temporary union of two sexes. — the spontaneous separation of parts. — organs situated in the breast. — in the side. — near to the head. — in the opposite extremity. — an intransient organ of the male and a recipient organ of the female. — an intransient organ of the female and a recipient organ of the male. — the stamens and pistils of flowers. — the seminal secretion of the male thrown into the organs of the female. — sprinkled at the entrance of the female organs. — thrown upon them from a distance. — transported to them by the winds. — sprinkled on the embryo after emission. — dissolved in a fluid secreted by the female before it can rightly perform its office. — dissolved in water. — dissolved perhaps sometimes in air, as in the case of diœcous plants, where it probably acts like an aroma. |
| 13. SLEEP. | Natural sleep is occasioned | <ul style="list-style-type: none"> By quietness. — the absence of stimuli. — the sameness of stimuli when long continued. — deficient assimilation. — deficient irritability, which is owing sometimes to the weakness, inattention, or confined powers of the mental principle. |
| 14. DEATH. | Happens naturally to some species of living bodies | <ul style="list-style-type: none"> After hours. — days. — weeks. — months. — seasons. — years. Not till after centuries. |

All living bodies are much exhausted after performing the act of generation, and many of the inferior plants and animals begin immediately to sicken and decay.

We conclude by confessing, that concerning many uses of the parts, and concerning different species of variety in the form, structure, and position of the organs, much, after all,

is still reserved for farther reading, for farther observation, and for future physiological arrangement.

PIA

PIA

PHYTOLACCA, *POKEWEEED*, or *American nightshade*, in botany, is of the *decandria monocladia* class of plants. It grows naturally in the province of Virginia in America. It hath a thick, fleshy, perennial root, divided into several parts as large as middling parsneps. From this rise many purplish, herbaceous stalks, about an inch thick, and six or seven feet long, which break into many branches, irregularly set with large, oval, sharp-pointed leaves, supported on short footstalks. These at first are of a fresh green colour, but as they grow old they turn reddish. At the joints and divisions of the branches come forth long bunches of small bluish-coloured flowers, consisting of five concave petals each, surrounding ten stamina and ten styles. These are succeeded by round depressed berries, having ten cells, each of which contains a single smooth seed.

In Virginia and other parts of America the inhabitants boil the leaves, and eat them in the manner of spinach. They are said to have an anodyne quality, and the juice of the root is violently cathartic. The stems when boiled are as good as asparagus. The Portuguese had formerly a trick of mixing the juice of the berries with their red wines, in order to give them a deeper colour; but as it was found to debase the flavour and to make the wine deleterious, the matter was represented to his Portuguese Majesty, who ordered all the stems to be cut down yearly before they produced flowers, thereby to prevent any further adulteration. The same practice was common in France till it was prohibited by an edict of Louis XVI. and his predecessor under pain of death. This plant has been said to cure cancers; but the truth of this assertion has not been indisputably proved, and does not appear very probable.

PHYTOLOGY, a discourse concerning the kinds and virtues of plants. See **BOTANY**, and **MATERIA Medica**.

PHYTON, a general of the people of Rhegium against Dionysius, the tyrant of Sicily. He was taken by the enemy, and tortured, and his son was thrown into the sea. See **SYRACUSE**.

PIA MATER. See **ANATOMY**, n^o 130. p. 756, &c.

PIABA, in ichthyology, is a small fresh-water fish, caught in all the rivers and brooks in the Brasils, and in some other parts in America. It is about the bigness of the common minnow; is well tasted, and much esteemed by the natives.

PIABUCU, in ichthyology, is an American fish eaten in many places by the natives. It is ravenous, and so greedy of blood, that if a person goes into the water with a wound in any part of his body, the piabucu will make up to it to suck the blood. It seldom exceeds four inches in length.

PIACENZA is a city of Italy, in the duchy of Parma, in E. Long. 10. 25 N. Lat. 45. It is a large handsome city, whose name is derived by some from its pleasant situation, in a fruitful plain, on the *Via Æmilia*, about half a mile from the Po. It is the see of a

bishop suffragan of Bologna, and has a university, but of no great fame. It is defended by a wall and a strong citadel, and is reckoned about three miles in circumference, so that it is somewhat bigger than Parma. The houses are low, but prettily built; the great street called the *Stradone* is in a direct line and of equal breadth, with a foot-way fenced with posts on each side like London, and is about 3000 feet long. The houses are generally built of brick, and some of them are prettily painted. The cathedral is an old structure, but well adorned within. The duke of Parma, who is sovereign of Piacenza, has a palace in the city built by Vignola. There are many excellent paintings in this place. There are two chapels painted, one with the history of St Catharine, and the other with a picture of Christ, as also the altar of the church of St Augustin, all by Pordenone. In the same church there is a fine picture of the blessed virgin, St Peter, and St Paul, by Paolo Veronese. At the Capuchins there is a Francis by Guercino. There is a fountain said to have been erected here by Julius Cæsar, and the equestrian statues of the famous general Alexander I. duke of Parma and Placentia, and of his son Ranuccio, both in the great square. In the palace of Scotti, there are a great many fine pictures by Landiscio, who had been a page in their family, and among the rest the rape of Helen, the taking of Troy, the blessed virgin, and St Francis. The trade of this city consists chiefly in their cheese, as at Parma, these cities being surrounded with the richest pasture grounds in Italy; though the greatest part of what we call the Parmesan cheese is made in the duchy of Milan, and particularly at Lodi. See **PARMESAN CHEESE** — Without the walls, which are washed by the rivers Trebbia and Po, there is a large seminary or college, magnificently erected by cardinal Alberoni, a native of this city, but considerably hurt by the modern Goths in the last war. Towards the north of the city is the mouth of the river Trebbia, famous for the victory which Hannibal obtained over the Romans.

PIASTUS, a native of Poland, was originally a wheelwright and the son of Cessico, a citizen of Cruswitz. He flourished in the year 830, when on the extinction of the family of Popiel great disputes arose about his successor, and Cracow was afflicted with a severe famine. During this extremity, when the people were dropping down in the streets, two angels in human forms, as the story is told, took up their residence with Piastus, who was celebrated for his piety and extensive charity. He had nothing left but a small cask of the common liquor of the country, and this he presented to his new guests, who, charmed with his hospitality, promised him the crown of Poland. The faith of Piastus was equal to his other virtues: he implicitly believed the word of his guests, and piously followed their directions in every particular. He was ordered to distribute the liquor out of his little cask to the multitude: he did so, and found that it was inexhaustible. The people were astonished; all cried out,

Piacenza, Piastus.

Med. Univ. History, vol. xxi. p. 336, &c.

Piaſtus
||
P broct.

"A miracle!" and the electors determined to chufe a perſon in whoſe favour Heaven had ſo viſibly declared: Piaſtus was accordingly taken from his ſhop, and raiſed to the ducal dignity.

Such is the relation of the canon of Cracow, which differs in many particulars from the account given by Guagnini, and ſeveral other hiſtorians. According to them, Piaſtus had prepared a ſmall collation, to entertain ſome friends who were aſſembled at the birth of a child. Two pilgrims, Paul and John, afterwards murdered at Rome, came about this time to Cracow. They begged charity at the door of the election hall, and were rudely repulſed; upon which they ſtumbled on the houſe of Piaſtus, and were kindly received. The miracle we have mentioned was wrought by them; and the two pilgrims, and not angels, were the inſtruments of the elevation of the hoſpitable wheelwright. Though we pay but little regard to the marvellous means by which Piaſtus aſcended the ducal throne of Poland, it would be preſumptuous entirely to omit a fact attested by all the writers upon this ſubject: it was proper, therefore, to take notice of it, and we leave the reſt to the reader's judgment.

Being now raiſed to the ſupreme dignity, he was not intoxicated with his proſperity. His natural charity, benevolence, and ſweetneſs of diſpoſition, remained: nothing was altered but his power of doing good. He was truly called the father of his people: the injured never returned unredreſſed, nor merit unrewarded. Piaſtus wiped the tear from the eyes of the widow; and was himſelf the guardian of the orphan, and the general patron of the poor and diſtreſſed. His excellent inclinations ſerved him in the room of great abilities; and the happineſs that his people enjoyed made them forget that their prince was not born a ſtateſman and a warrior. Several inſtantine commotions aroſe during his adminiſtration, all which he quelled by the mildneſs and clemency of his nature: his nobility were aſhamed of rebelling againſt a ſovereign who devoted his whole life to render his people happy. He removed the court from Crufwitz, a city which he deteſted, becauſe it was the ſcene of Popiel's crimes and tragical end, and fixed his reſidence at Gneſna, where he died beloved, eſteemed, and even adored by his ſubjects.

It is in memory of this excellent prince, that all the natives of Poland, who have been ſince promoted to the ducal or regal dignity, were called Piaſtes, in contradiſtinction to the foreigners.

Piaſtus aſſociated his ſon Ziemovitus with him in the government before his death; a circumſtance of much benefit to the people.

PIAZZA, in building, popularly called *piache*, an Italian name for a portico, or covered walk, ſupported by arches.

The word literally ſignifies a broad open place or ſquare; whence it alſo became applied to the walks or porticoes around them.

PIBROCH, ſays Dr Beattie*, is a ſpecies of tune peculiar, I think, to the Highlands and Weſtern Iſles of Scotland. It is performed on a bagpipe, and differs totally from all other muſic. Its rythm is ſo irregular, and its notes, eſpecially in the quick movement, ſo mixed and huddled together, that a ſtranger finds it almoſt impoſſible to reconcile his ear to it, ſo as to

perceive its modulation. Some of theſe piſ-rochs, being intended to repreſent a battle, begin with a grave motion reſembling a march, then gradually quicken into the onſet; run off with noiſy conſuſion and turbulent rapidity, to imitate the conflict and purſuit; then ſwell into a few flouriſhes of triumphant joy; and perhaps cloſe with the wild and ſlow wailings of a funeral proceſſion.

PICA, in ornithology. See CORVUS, ſp. 9.

PICA marina, in ornithology. See HÆMATOPUS, and ALCA, n° 3.

PICA, in medicine, a depravation of appetite, which makes the patient long for what is unfit for food, or incapable of nourishing; as chalk, aſhes, coals, plafter-line, &c. See MEDICINE, n° 371.

PICA, or *pye*, had formerly the ſame ſenſe as *ordinal*, meaning a table or directory, pointing out the order in which the devotional ſervices appointed for different occaſions were to be performed. Accordingly we are told it is derived from *pi*, a contraction of *tabula*, a table; and by others from *litera piata*, a great black letter at the beginning of ſome new order in the prayer. The term was uſed in a ſimilar ſenſe by officers of civil courts, who called their calendars or alphabetical catalogues directing to the names and things contained in the rolls and records of their courts the *pyes*.

PICARD, a native of the Netherlands, who founded a ſect the profeſſors of which were called *Picards*. See PICARDS.

PICARD (John), an able mathematician, and one of the moſt learned aſtronomers of the 17th century, was born at Fleche, and became prieſt and prior of Rille in Anjou. Going to Paris, he was in 1666 received into the Academy of Sciences in quality of aſtronomer. In 1671, he was ſent, by order of the king, to the caſtle of Uraniburg, built by Tycho Brahe in Denmark, to make aſtronomical obſervations there; and from thence he brought the original manuſcripts wrote by Tycho Brahe, which are the more valuable as they differ in many places from the printed copies, and contain a book more than has yet appeared. He made important diſcoveries in aſtronomy; and was the firſt who travelled through ſeveral parts of France, to meaſure a degree of the meridian. His works are, 1. A treatiſe on levelling. 2. Fragments of dioptrics. 3. *Experimenta circa aquas eſſentias*. 4. *De menſuris*. 5. *De menſura liquidorum & aridorum*. 6. A voyage to Uraniburg, or aſtronomical obſervations made in Denmark. 7. Aſtronomical obſervations made in ſeveral parts of France, &c. Theſe, and ſome other of his works, which are much eſteemed, are in the ſixth and ſeventh volumes of the Memoirs of the Academy of Sciences.

PICARDS, a religious ſect which aroſe in Bohemia in the 15th century.

Picard, the author of this ſect, from whom it derived its name, drew after him, as has been generally ſaid, a number of men and women, pretending he would reſtore them to the primitive ſtate of innocence wherein man was created: and accordingly he aſſumed the title of the *New Adam*. With this pretence he taught his followers to give themſelves up to all impurity; ſaying that therein conſiſted the liberty of the ſons of God; and that all thoſe not of their ſect were in bondage.

He

* Eſays by
Dr Beattie,
8vo edit.
p. 422.
1706.

Pica
||
Picards.

Picards

He first published his notions in Germany and the low countries, and persuaded many people to go naked, and gave them the name of *Adamites*. After this he seized on an island in the river Lausneez, some leagues from Thabor, the head quarters of Zisca, where he fixed himself and his followers. His women were common, but none were allowed to enjoy them without his permission: so that when any man desired a particular woman, he carried her to Picard, who gave him leave in these words, *Go, increase, multiply, and fill the earth*.

At length, however, Zisca, general of the Hussites, (famous for his victories over the emperor Sigismund), hurt at their abominations, marched against them, made himself master of their island, and put them all to death except two; whom he spared, that he might learn their doctrine.

Such is the account which various writers, relying on the authorities of Aeneas Sylvius and Varillas, have given of the Picards, who appear to have been a party of the Vaudois, that fled from persecution in their own country, and sought refuge in Bohemia. It is indeed doubtful whether a sect of this denomination, chargeable with such wild principles and such licentious conduct, ever existed; and it is certainly astonishing that Mr Bayle, in his art. *Picards*, should adopt the reproachful representations of the writers just mentioned: for it appears probable at least that the whole is a calumny invented and propagated in order to disgrace the Picards, merely because they deserted the communion and protested against the errors of the church of Rome. Lactius informs us, that Picard, together with 40 other persons, besides women and children, settled in Bohemia in the year 1418. Balbinus the Jesuit, in his *Epitome Rerum Bohemicarum*, lib. ii. gives a similar account, and charges on the Picards none of the extravagancies or crimes ascribed to them by Sylvius. Schlecta, secretary of Ladislaus, king of Bohemia, in his letters to Erasmus in which he gives a particular account of the Picards, says that they considered the pope, cardinals, and bishops of Rome, as the true Antichrists, and the adorers of the consecrated elements in the eucharist as downright idolaters; that they denied the corporal presence of Christ in this ordinance: that they condemned the worship of saints, prayers for the dead, auricular confession, the penance imposed by priests, the feasts and vigils observed in the Romish church; and that they confined themselves to the observance of the sabbath, and of the two great feasts of Christmas and Pentecost. From this account it would appear that they were no other than the Vaudois; and M. de Beaupre has shown that they were both of the same sect, though under different denominations. Besides, it is certain that the Vaudois were settled in Bohemia in the year 1418, where some of them adopted the rites of the Greek, and others those of the Latin, church. The former were pretty generally adhered to till the middle

of the 14th century, when the establishment of the Latin rites caused great disturbance. On the commencement of the national troubles in Bohemia, on account of the opposition to the papal power (see MORAVIANS), the Picards more publicly avowed and defended their religious opinions; and they formed a considerable body in an island by the river Lausnitz or Lausneez, in the district of Bechin, and recurring to arms, were defeated by Zisca. *Encyclop. art. Picards*.

PICARDY, a province in France, is bounded on the north by Hainault, Artois, and the Straits of Calais; on the east by Champagne; on the south by the Isle of France; and on the west by Normandy and the English Channel (A). This province is long and narrow, being usually compared to a bent arm; and in this figure is nearly 150 miles in length, but not above 40 in breadth, and in many places not above 20. It is generally a level country; and produces wine, fruit of all kinds, plenty of corn, and great quantities of hay: but wood being scarce, most of the inhabitants burn turf. They have, however, some pit-coal, but it is not so good as that of England. It was united to the crown of France in the year 1643; and is supposed to contain 533,000 inhabitants.

Its principal rivers are the Somme, the Oise, the Canche, the Lanthie, the Lys, the Aa, the Scarpe, and the Deule.

The situation of this province on the sea, its many navigable rivers and canals, with the industry of the inhabitants, render it the seat of a flourishing trade. In it are made beautiful silk stuffs, woollen stuffs, coarse linen, lawn, and soap; it also carries on a large trade in corn and pit-coal. In the government of Calais and Boulogne are annually bred 5000 or 6000 colts, which being afterwards turned loose in the pastures of Normandy, are sold for Norman horses. The fisheries on this coast are also very advantageous. This province is divided into Upper, Middle, and Lower Picardy; and is again subdivided into four deputy-governments. The principal town is Amiens.

PICART (Bernard), a celebrated engraver, son of Stephen Picart, also a famous engraver, was born at Paris in 1673. He learned the elements of his art from his father, and studied architecture and perspective under Sebastian le Clerc. As he embraced the reformed religion, he settled in Holland to enjoy the free exercise of it; where his genius produced those masterpieces which made him esteemed the most ingenious artist of his age. A multitude of books are embellished with plates of his engraving. He died in 1733.

PICCOLOMINI (Alexander), archbishop of Patras, and a native of Sienna, where he was born about the year 1528, was of an illustrious and ancient family, which came originally from Rome, but afterwards settled at Sienna. He competed with success for the theatre; but he was not more distinguished by his genius, than by the purity of his manners, and his regard to virtue. His charity was very great; and was chiefly exerted

Picardy

Piccolo-
mini.

(A) The origin of the name of this province does not date earlier than A. D. 1200. It was an academical joke; an epithet first applied to the quarrelsome humour of those students in the university of Paris who came from the frontier of France and Flanders, and hence to their country. *Falgi's Notitia Galliarum*, p. 447. *Lorguerac, Description de la France*, p. 52.

Piccolomini.

exercised in relieving the necessities of men of letters. He has left behind him a number of works in Italian. The most remarkable of which are, 1. Various Dramatic Pieces, which laid the first foundation of his character as a writer. 2. A Treatise on the Sphere. 3. A Theory of the Planets. 4. A Translation of Aristotle's Art of Rhetoric and Poetry, in 4to. 5. A System of Morality, published at Venice, 1575, in 4to; translated into French by Peter le Larivey in 4to; and printed at Paris, 1581. These, with a variety of other works, prove his extensive knowledge in natural philosophy, mathematics, and theology. He was the first who made use of the Italian language in writing upon philosophical subjects. He died at Sienna the 12th of March 1578, aged 70. A particular catalogue of his works may be seen in the Typographical Dictionary. There is one performance ascribed to this author, intitled *Dialogo della bella Greanta delle Donne*, (printed at Milan, 1558, and at Venice, 1574, in 8vo.); which but ill suits the dignity of a prelate. It is filled with maxims which have an evident tendency to hurt the morals of young women. Piccolomini's name, indeed, is not in the title page; and it has all the appearance of being a juvenile production. It is very scarce; and the public would sustain no loss by its being entirely out of print. It was translated into French by F. d'Ambroise, and published at Lyons, in 16mo, under the title of *Institution des jeunes dames*. It was afterwards reprinted in 1583, under that of *Dialogue & Devis des Demeillees*.

PICCOLOMINI (Francis), of the same family with the foregoing, was born in 1520, and taught philosophy with success, for the space of 22 years, in the most celebrated universities of Italy, and afterwards retired to Sienna, where he died, in 1604, at the age of 84. The city went into mourning on his death. His works are, 1. Some Commentaries upon Aristotle, printed at Mayence, 1608, in 4to. 2. *Univerſa Philoſophia de Moribus*, printed at Venice, 1583, in folio. He laboured to revive the doctrine of Plato, and endeavoured also to imitate the manners of that philosopher. He had for his rival the famous James Zabarella, whom he excelled in facility of expression and neatness of discourse; but to whom he was much inferior in point of argument, because he did not examine matters to the bottom as the other did; but pressed too rapidly from one proposition to another.

PICCOLOMINI of Aragon (Octavius), duke of Amalfi, prince of the Empire, a general of the emperor's army, and knight of the order of the Golden Fleece, was born in 1599. He first bore arms among the Spanish troops in Italy. He afterwards served in the army of Ferdinand II. who sent him to the relief of Bohemia, and entrusted him with the command of the imperial troops in 1634. After having signalized himself at the battle of Nortlingue, he made Marshal de Châtillon raise the siege of St Omer. He had the good fortune to gain a victory over Marquis de Feuquieres in 1639: nor did the loss of the battle of Wolfenbuttel, in 1641, impair his glory. He died on the 10th of August 1656, being five years after, aged 57, without issue; and with the character of an able negotiator and an active general. The celebrated Caprara was his nephew.

PICCOLOMINI (James), whose proper name was Am-

manati, took that of Piccolomini in honour of his patron Pius II. He was born in a village near Lucca in 1422. He became bishop of Massa, afterwards of Fiesolati; a cardinal in 1461, under the name of *Gardinal de Paris*; and died in 1479, at the age of 57, of an inflammation of lungs. He left 8000 pitules in the bankers hands, which Pope Sixtus IV. claimed; and of which he gave a part to the Hospital of the Holy Ghost. His works, which consist of some Letters, and a History of his own time, were printed at Milan, in 1521, in folio. His history, intitled *Commentaries*, commences the 18th of June 1464, and ends the 6th of December 1469. They may very properly be considered as a Sequel of Pope Pius II.'s Commentaries, which end with the year 1463.

PICCOLOMINI, (Æneas Sylvius). See Pius II.

PICENTIA, (Strabo, Pliny), the capital of the Picentini, whose territory, called *Ager Picentinus*, a small district, lay on the Tuscan Sea, from the *Promontorium Minerve*, the south boundary of Campania on the coast, to the river Silarus, the north boundary of Lucania, extending within-land as far as the Samnites and Hirpini, though the exact termination cannot be assigned. The Greeks commonly confound the *Picentini* and *Picentes*, but the Romans carefully distinguish them. The former, with no more than two towns that can be named, *Silernum* and *Picentia*; the situation of both doubtful: only Pliny says the latter stood within-land, at some distance from the sea. Now thought to be *Bicenza*, (Holstenius), in the Principato Citra of Naples.

PICENUM, (Cæsar, Pliny, Florus); *PICENUS AGER*, (Cicero, Sallust, Livy, Tacitus); *Ager Picentium*, (Varro): a territory of Italy, lying to the east of Umbria, from the Apennine to the Adriatic; on the coast extending from the river Aesis on the north, as far as the *Preutiani* to the south. In the upper or northern part of their territory the Umbri excluded them from the Apennine, as far as Camerinum, (Strabo); but in the lower or southern part they extended from the Adriatic to the Apennine. A very fruitful territory, and very populous. *Picentes*, the people, (Cicero); from the singular, *Picens*, (Livy): different from the *Picentini*, on the Tuscan sea, though called so by the Greeks; but Ptolemy calls them *Piceni*, as does also Pliny. Their territory at this day is supposed to form the greatest part of the March of Ancona, (Cluverius).

PICHFORD, in the county of Salop in England; on the south-east side of Shrewsbury, near Condover. It is noted for a spring of pitchy water (from whence some derive its name), on the top of which there always flows a sort of liquid bitumen. Over most of the coal pits hereabouts there lies a stratum of blackish rock; of which, by boiling and grinding, they make pitch and tar, and also distil an oil from it.

PICHINCHA, a mountain in Peru. See PERU, n° 56.

PICKERING, in the north riding of Yorkshire in England, 13 miles from Scarborough, and 225 from London, is a pretty large town belonging to the duchy of Lancaster, on a hill among the wild mountains of Blakemore; having the forest of Pickering on the north, and Pickering-common on the south. It is said to have been built 270 years before Christ by Peridurus, a king of the Britons, who was buried here. It had once a castle, the ruins of which are still to be

Piccolomini.
II.
Pickering.

Pickery || Pico. seen; to whose jurisdiction many of the neighbouring villages were subject: and the adjacent territory, commonly called Pickering-Lath, or the liberty or forest of Pickering, was given by Henry III. to his son Edmund earl of Lancaster. A court is kept here for all actions under 40s. arising within the honour of Pickering.

PICKERY, in Scots law, petty theft, or stealing things of small value.

PICKETS, in fortification, stakes sharp at one end, and sometimes shod with iron, used in laying out the ground, of about three feet long; but, when used for pinning the fascines of a battery, they are from three to five feet long.

PICKETS, in artillery, are about five or six feet long, shod with iron, to pin the park lines, in laying out the boundaries of the park.

PICKETS, in the camp, are also stakes of about six or eight inches long, to fasten the tent cords, in pitching the tents; also, of about four or five feet long, driven into the ground near the tents of the horsemen, to tie their horses to.

PICKET, an out-guard posted before an army, to give notice of an enemy approaching.

PICKET, a kind of punishment so called, where a soldier stands with one foot upon a sharp-pointed stake; the time or his standing is limited according to the offence.

PICKLE, a brine or liquor, commonly composed of salt, vinegar, &c. sometimes with the addition of spices, wherein meat, fruit, and other things, are preserved and seasoned.

PICO, one of the Azore Islands, is so-called from some lofty mountains on it; or rather from one very high mountain, terminating like Tencriffe in a peak, and reputed by some writers equal to it in height. This island lies about four leagues south-west from St George, twelve from Terreza, and about three leagues south-east of Fayal; in W. Long. 28. 21. and N. L. t. 38. 29. The mountain Pico, which gives name to the island, is filled with dismal dark caverns or volcanoes, which frequently vomit out flames, smoke, and ashes, to a great distance. At the foot of this mountain towards the east is a spring of fresh water, generally cold, but sometimes so heated with the subterraneous fire, as to rush forth in torrents with a kind of ebullition like boiling water; equalling that in heat, and sending forth a steam of sulphureous fetid vapours, liquefied stones, minerals, and flakes of earth all on fire, in such quantities, and with such a violence, as to have formed a kind of promontory vulgarly called *Myllerios*, on the declivity of the coast, and at the distance of 1200 paces from the fountain. Such at least is the account of Ortelius; though we do not find this last circumstance of the promontory confirmed by later observations. The circumference of Pico is computed at about 15 leagues: and its most remarkable places are Pico, Lagoas, Santa Cruce or Cruz, San Sebastian, Pesquin, San Rocko, Playa, and Magdalena; the inhabitants of which live wholly on the produce of the island, in great plenty and felicity. The cattle are various, numerous, and excellent in their several kinds: it is the same with the vine; and its juice, prepared into different wines, the best in the Azores. Besides cedar and other timber, they have a kind of wood which they call *tinco*, solid and hard as iron; and vein-

ed, when finely polished, like a rich scarlet tably; which colour it has in great perfection. The longer it is kept, the more beautiful it grows: hence it is, that the *tinco* tree is felled only for the king's use or by his order; and is prohibited from being exported as a common article of trade.

Pico Marina, a sea fish common at Kongo in Africa, derives its name from the resemblance of its mouth to the beak of a wood-pecker. It is of a large size, and prodigious strength, has four fins on its back, three under its belly, and one on each side of its head; its tail is large and forked, by which it cuts the waves with surprising force and velocity. It is at war with every fish that swims, and with every thing it meets in its way, without being intimidated by the largest vessels; a surprising instance of which intrepidity, we are told by some missionaries, whose ship was attacked by one of them, near these coasts, in the dead of night. The violence of the shock which it gave to the vessel quickly awakened the captain and the rest of the people; who immediately ran to the ship's side, where they perceived, by moon light, this huge monster fluted by its forehead to the vessel, and making the strongest efforts to disengage itself; upon which some of them tried to pierce him with their pikes, but he got off before they could accomplish their aim. On the next morning, upon visiting that side of the vessel, they found, about a foot below the surface of the water, a piece of its bony snout stuck fast into the wood, and two or three inches of it project ing outwards. They went presently after to visit the inside of the ship, and discovered about five or six inches more of the point of the horn which had penetrated through the plank.

PICQUERING, a flying war, or skirmish, made by soldiers detached from two armies for pillage, or before a main battle begins.

PICQUET, or **PICKET**. See **PIQUET**.

PICRAMNIA, in botany: A genus of the pentandria order, belonging to the dioecia class of plants; and in the natural method ranking with those that are doubtful. The calyx is tripartite; the corolla has three petals; the stamina from three to five, awl shaped, and seem to join together at the base; there are two styles, which are short and bent backwards; the berry is roundish, and contains two oblong seeds, and sometimes one seed only. There is only one species, viz. the antidesma, or nujee bush. This shrub is frequent in copses and about the skirts of woods in Jamaica, rising about eight or nine feet from the ground. The leaves are of an oval form, pointed and placed in an alternate form along the branches; the flower spikes are long, pendulous, and slender; the flowers small and white: the berries are numerous; at first red, then of a jet black colour; the pulp is soft, and of a purple complexion.—The whole plant is bitter, and especially the berry. The berries make a decoction of them, and use it in weaknesses of the stomach and in venereal cases.

PICRANIA *amara*, or *Bitter Wood*, is a tall and beautiful timber tree, common in the woods of Jamaica. It is a new genus, belonging to the pentandria monogynia of Linnæus. The name is expressive of its sensible qualities.

Every part of this tree is intensely bitter; and even after the tree has been laid for floors many years, who-

Pico
||
Pico.

Med. Univ.
Histry,
vol. xiii.
1. 46. Sec.

Pieris
||
Pictet.

ever rubs or scrapes the wood, feels a great degree of bitterness in their mouth or throat. Cabinet-work made of this wood is very useful, as no insect will live near it.

This tree has a great affinity to the *Quassia Amara* of Linnaeus; in lieu of which it is used as an antiseptic in putrid fevers. When used, less of it will do than of the *Quassia Amara* of Surinam. See QUASSIA.

PICRIS, Ox-tongue; a genus of the polygamia equalis order, belonging to the synchrotrichs of plants. There are four species, of which the only remarkable one is the echioides, or common ox-tongue, growing spontaneously in corn-fields in Britain. It has undivided leaves embracing the stem, with yellow blossoms, which sometimes close soon after noon, at other times remain open till nine at night. It is an agreeable pot herb while young. The juice is milky, but not too acrid.

PICRUM, in botany: A genus of the monogynia order, belonging to the tetrandria class of plants; and in the natural method ranking with those that are doubtful. The calyx is monophyllous and quinquefid; the corolla monopetalous, and its tube is short; the filaments are four in number, and hooded at the place of their insertion; the style long and thick; the stigma bifid; the capsule is round, bivalved, and contains a number of small seeds.—There are two species, viz. the *spicata* and *ramosa*; both natives of Guiana. Both species are bitter, and employed in dyspepsy, and to promote the menses: they are also recommended in visceral obstructions.

PICTET (Benedict), born at Geneva, in 1655, of a distinguished family, prosecuted his studies with great success. After having travelled into Holland and England, he taught theology in his own country with an extraordinary reputation. The university of Leyden, after the death of Spanheim, solicited him to come and fill his place; but he thought that his own country had the best right to his services: and for that generosity he received its thanks by the mouth of the members of council. A languishing disorder, occasioned by too much fatigue, hastened his death; which happened on the 9th of June 1724, at the age of 69 years. This minister had much sweetness and affability in his manner. The poor found in him a comfort and a father. He published a great number of works in Latin and French, which are much esteemed in Protestant countries. The principal of these are, 1. A System of Christian Theology in Latin, 3 vols. in 4to; the best edition of which is that of 1721. 2. Christian Morality, printed at Geneva, 1710, 8 vols. in 12mo. 3. The History of the 11th and 12th centuries; intended as a sequel to that of Sueton, printed in 1713, 2 vols. in 4to. The Continuator is held in higher estimation than the first author. 4. Several Controversial Treatises. 5. A great number of tracts on morality and piety: among which we must distinguish "the Art of Living and dying well;" published at Geneva, 1705, in 12mo. 6. Some Letters. 7. Some Sermons, from 1697 to 1721; 4 vols. in 8vo. With a vast number of other books, the names of which it would be tedious to mention; but which, as Mr. Smollett says, "all show evident marks of piety and good sense."

PIERET (John-Louis), a counsellor of Geneva, born in 1739, was of the same family. He was member of the Council of Two Hundred; Counsellor of State and Syndic; and died in 1781. He applied himself to the study of astronomy, and made several voyages into France and England for his improvement. Few men were ever blessed with a clearer or more enlightened understanding. He has left in manuscript the "Journal of a Voyage which he made to Russia and Siberia in 1768 and 1769, in order to observe the transit of Venus over the sun's disk." A work very interesting, from the lively descriptions which it gives both of men and of nature.

PICTLAND. See PENTLAND.

PICTS, the name of one of those nations who anciently possessed the north of Britain. It is generally believed that they were so called from their custom of painting their bodies; an opinion which Camden supports with great erudition. (See Gough's edition, Vol. I. p. xci. of the preface). It is certainly liable, however, to considerable objections; for as this custom prevailed among the other ancient inhabitants of Britain, who used the *glayum* of Pliny and the *vitrum* of Mela for the like purpose, it may be asked, Why the name of *Picti* was confined by the Romans to only one tribe, when it was equally applicable to many others? Why should they design them only by an epithet without ever annexing their proper name? Or why should they impose a new name on this people only, when they give their proper name to every other tribe which they have occasion to speak of? As these questions cannot be answered in any satisfactory manner, it is plain we must look for some other derivation of the name.

The Highlanders of Scotland, who speak the ancient language of Caledonia, express the name of this once famous nation by the term *Pictich*; a name familiar to the ears of the most illiterate, who could never have derived it from the Roman authors. The word *Pictich* means *pillagers* or *plunderers*. The appellation was probably imposed upon this people by their neighbours, or assumed by themselves, some time after the reign of Caracalla, when the ungoverned state of the Roman province, on which this people bordered, gave them frequent opportunities of making incursions thither, and committing depredations. Accordingly this name seems to have been unknown till the end of the 3d century. Eumenius the panegyrist is the first Roman author who mentions this people under their new name of *Pictich*, or, with a Latin termination, *Picti*. When we say that this name may have been probably assumed for the reason just now mentioned, we must observe, that, in those days of violence, the character of a robber was attended with no disgrace. 1. he had the address to turn his schemes well, and to execute them successfully, he was rather praised than blamed for his conduct; providing he made no encroachments on the property of his own tribe or any of its allies. We mean this as no peculiar stigma upon the Picts; for other nations of antiquity, in the like rude state, thought and acted as they did. See *Thorydales*, lib. 3. p. 3. and *Virg. Aen.* 7. 745 et 749.

Concerning the origin of the Picts, authors are much divided. Boethius derives them from the Aga-

Pictet
||
Pictet.

1
Name.

2
Origin.

Picts.

thyrsi, Pomponius Lætus from the Germans, Bede from the Seythians, Camden(A) and Father Lunes from the ancient Britons, Stillingfleet from a people inhabiting the Cimbrica Chersonesus, and Keating and O'Flaherty, on the authority of the Psalter Cathel, derive them from the Thracians. But the most probable opinion is, that they were the descendants of the old Caledonians. Several reasons are urged in support of this opinion by Dr Macpherson; and the words of Eumenes, "Caledonum, aliorumque Pictorum, filvas," &c. plainly imply that the Picts and Caledonians were one and the same people.

As there has been much dispute about the origin of the Picts, so there has been likewise about their language. There are many reasons which make it plain that their tongue was the Gaelic or Celtic; and these reasons are a further confirmation of their having been of Caledonian extract. Through the east and north-east coasts of Scotland (which were possessed by the Picts) we meet with an innumerable list of names of places, rivers, mountains, &c. which are manifestly Gaelic. From a very old register of the priory of St Andrew's (Dalrymple's Collections, p. 122.) it appears, that in the days of Hungus, the last Pictish king of that name, St Andrew's was called *Mukrofs*; and that the town now called *Queensferry* had the name of *Ardehinneachan*. Both these words are plain Gaelic. The first signifies "the heath or promontory of boars;" and the latter, "the height or peninsula of Kenneth." In the list of Pictish kings published by Father Innes, most of the names are obviously Gaelic, and in many instances the same with the names in the list of Scottish or Caledonian kings published by the same author. Had Innes understood any thing of this language, he would not have supposed with Camden that the Picts spoke the British tongue. It was unlucky that the two words on which they built their conjecture (*Strath* and *Aber*) are as common in the Gaelic as they could have been in the British, and at this day make a part of the names of places in countries to which the Pictish empire never extended. The names of *Strathfillan* and *Lochaber* may serve as instances.

The venerable Bede, as much a stranger to the Celtic as either of the antiquaries just now mentioned, is equally unhappy in the specimen which he gives of the Pictish language in the word *penuahel*, "the head of the wall." Allowing the commutation of the initial *p* into *c*, as in some other cases, this word has still the same meaning in Gaelic which Bede gives it in the Pictish. It is true, there might have been then, as well as now, a considerable difference between various dialects of the Celtic; and thus, perhaps, that pious author was led to discover five languages in Britain agreeably to the *five books of Moses*: A conceit from which the good man derived a great deal of harmless satisfaction.

The Picts of the earliest ages, as appears from the joint testimony of all writers who have examined the Vol. XIV. Part II.

subject, possessed only the east and north-east coast of Scotland. On one side, the ancient Drumalbin, or that ridge of mountains reaching from Lochlomond near Dumbarton to the frith of Taine, which separates the county of Sutherland from a part of Ross, was the boundary of the Pictish dominions. Accordingly we find in the life of Columba, that, in travelling to the palace of Brudius, king of the Picts, he travelled over Drumalbin, the *Dorsum Britannia* of Adamnan. On the other side, the territory of the Picts was bounded by the Roman province. After Britain was relinquished by the emperor Honorius, they and the Saxons by turns were masters of those countries which lie between the frith of Edinburgh and the river Tweed. We learn from Bede, that the Saxons were masters of Galloway when he finished his Ecclesiastical History. The Picts, however, made a conquest of that country soon after; so that, before the extinction of their monarchy, all the territories bounded on the one side by the Forth and Clyde, and on the other by the Tweed and Solway, fell into their hands.

The history of the Picts, as well as of all the other ancient inhabitants of Britain, is extremely dark. The Irish historians give us a long list of Pictish kings, who reigned over Pictavia for the space of eleven or thirteen centuries before the Christian era. After them Innes, in his Critical Essay, gives us a list of above fifty, of whom no less than five held the sceptre, each for a whole century. It is probable that these writers had confounded the history of the Picts with that of their ancestors the old Caledonians. In any other view, their accounts of them are highly fabulous; and have been long ago confuted by Dr Macpherson of Slate, an antiquary of much learning and research. The Picts, as has been already observed, were probably not known by that name before the 2d or 3d century. Adamnan, abbot of Iona, is the first author that expressly mentions any Pictish king; and the oldest after him is Bede. We are informed by these two writers, that St Columba converted Brudius king of the Picts to the Christian faith. Columba came into Britain in the year of the vulgar era 565. Before that period we have no general record to ascertain so much as the name of any Pictish king. The history of *Druif* or *Dress*, who is said to have reigned over the Picts in the beginning of the fifth century, when St Ninian first preached the gospel to that nation, has all the appearance of fiction (B). His having reigned a hundred years, and his putting an end to a hundred wars, are stories which exceed all the bounds of probability.

Brudius, the contemporary of Columba, is the first Pictish king mentioned by any writer of authority.

What figure his an editors made, or who were his successors on the throne of Pictavia, cannot be ascertained. Bede informs us, that, during the reign of one of them, the Picts killed Egfred king of Northumberland in battle, and destroyed the greatest part of

4 Z

his

(A) See Gough's edition of Camden, Vol. I. Preface, p. xc. and the *Ancient Universal History*, Vol. XVII. p. 39, &c.

(B) According to Camden, this conversion happened about the year 630, in the southern Pictish provinces; while the northern, which were separated by fruitful mountains, were converted by Columba.

3
Language.4
Territory.

Picts.

his army. The same author mentions another of their kings called *Naitan*, for whom he had a particular regard. It was to this *Naitan* that Ceolfrid, abbot of Wiremouth, wrote his famous letter concerning Easter and the Tonsure (c); a letter in which Bede himself is supposed to have had a principal hand. Roger Hoveden and Simon of Durham mention two other Pictish kings *Onnuist* and *Kinoth*, the first of whom died in 761, and the latter flourished about the 774, and gave an asylum to Alfred of Northumberland, who was much about that time expelled his kingdom. The accounts given by the Scots historians of several other Pictish kings cannot be depended on; nor are the stories told by the British historians, Geoffroy of Monmouth and the author of the *Eulogium Britannicæ*, worthy of much greater credit.

In the ninth century the Pictish nation was totally subdued by the Scots in the reign of Kenneth Macalpin. Since that time their name has been lost in that of the conquerors, with whom they were incorporated after this conquest; however, they seem to have been treated by the Scottish kings with great lenity, so that for some ages after they commanded a great deal of respect. The prior of Hogulstead, an old English historian, relates, that they made a considerable figure in the army of David the Saint, in his disputes with Stephen king of England. In a battle fought in the year 1136, by the English on one side, and the Scots and Picts on the other, the latter insisted on their hereditary right of leading the van of the Scots army, and were indulged in that request by the king.

The principal seat of the Pictish kings was at Abernethy. Brudius, however, as appears from the accounts given by Adamnan, in his life of Columba, had a palace at Inverness, which was probably near the extremity of his territory in that quarter; for there is no good reason for believing, with Camden, that this king had any property in the Western Isles, or that he had made a gift of Iona to St Columba when he visited him in that place.

6
Manners.

With respect to the manners and customs of the Picts, there is no reason to suppose they were any other than those of the old Caledonians and Scots, of which many particulars are related in the Greek and Roman writers who have occasion to speak of those nations.

Upon the decline of the Roman empire, cohorts of barbarians were raised, and Picts were invited into the service, by Honorius, when peace was every where restored, and were named *Honoriaci*. Those under Constantine opened the passes of the Pyrenean mountains, and let the barbarous nations into Spain. From this period we date the civilization of their manners, which happened after they had by themselves, and then with the Scots, ravaged this Roman province.

Picts Wall, in antiquity, a wall begun by the emperor Adrian, on the northern bounds of England, to prevent the incursions of the Picts and Scots. It was first made only of turf strengthened with palisadoes, till the emperor Severus, coming into Britain in person, built it with solid stone. This wall, part of which still remains, begun at the entrance of the Solway Frith in Cumberland, and running north-east extended to the German Ocean. See ADRIAN and SEVERUS.

Pict. Wall
||
Picturesque
Beauty.

PICTURE, a piece of painting, or a subject represented in colours, on wood, canvas, paper, or the like. See PAINTING.

PICTURESQUE BEAUTY, says a late writer on that subject, refers to "such beautiful objects as are suited to the pencil." This epithet is chiefly applied to the works of nature, though it will often apply to works of art also. Those objects are most properly denominated picturesque which are disposed by the hand of nature with a mixture of *varied rudeness*, *simplicity*, and *grandeur*. A plain neat garden, with little variation in its plan, and no striking grandeur in its position, displays too much of art, design, and uniformity, to be called picturesque. "The ideas of *neat* and *smooth* (says Mr Gilpin), instead of being picturesque, in fact disqualify the object in which they reside from any pretensions to picturesque beauty. Nay, farther, we do not scruple to assert, that roughness forms the most essential point of difference between the beautiful and the picturesque: as it seems to be that particular quality which makes objects chiefly pleasing in painting. I use the general term *roughness*; but properly speaking roughness relates only to the surfaces of bodies: when we speak of their delineation, we use the word *ruggedness*. Both ideas, however, equally enter into the picturesque, and both are observable in the smaller as well as in the larger parts of nature; in the outline and bark of a tree, as in the rude summit and craggy sides of a mountain.

"Let us then examine our theory by an appeal to experience, and try how far these qualities enter into the idea of picturesque beauty, and how far they mark that difference among objects which is the ground of our inquiry.

"A piece of Palladian architecture may be elegant in the last degree; the proportion of its parts, the propriety of its ornaments, and the symmetry of the whole, may be highly pleasing; but if we introduce it in a picture, it immediately becomes a formal object, and ceases to please. Should we wish to give it picturesque beauty, we must use the mallet instead of the chisel; we must beat down one half of it, deface the other, and throw the mutilated members around in heaps; in short, from a smooth building we must turn it into a rough ruin. No painter who had the choice of the two objects would hesitate a moment.

"Again,

(c) We are told by some authors that Columba taught the Picts to celebrate Easter always on a Sunday between the 14th and 20th of March, and to observe a different method of tonsure from the Romans, leaving an imperfect appearance of a crown. This occasioned much dispute till Naitan brought his subjects at length to the Roman rule. In that age many of the Picts went on a pilgrimage to Rome, according to the custom of the times; and amongst the rest we find two persons mentioned in the antiquities of St Peter's church: *Asterius* count of the Picts, and *Syra* with his countrymen, performed their vow.

Pictureſque
Beauty.

"Again, why does an elegant piece of garden-ground make no figure on canvas? the ſhape is pleaſing, the combination of the objects harmonious, and the winding of the walk in the very line of beauty. All this is true; but the ſmoothneſs of the whole, though right and as it ſhould be in nature, offends in picture. Turn the lawn into a piece of broken ground, plant rugged oaks inſtead of flowering ſhrubs, break the edges of the walk, give it the rudeneſs of a road, mark it with wheel tracks, and ſcatter around a few ſtones and brushwood; in a word, inſtead of making the whole ſmooth, make it rough, and you make it alſo pictureſque. All the other ingredients of beauty it already poſſeſſed." On the whole, pictureſque compoſition conſiſts in uniting in one whole, a variety of parts, and theſe parts can only be obtained from rough objects.

It is poſſible therefore to find pictureſque objects among works of art, and it is poſſible to make objects ſo; but the grand ſcene of pictureſque beauty is nature in all its original variety, and in all its irregular grandeur. "We ſeek it (ſays our author) among all the ingredients of landſcape, trees, rocks, broken grounds, woods, rivers, lakes, plains, valleys, mountains, and diſtances. Theſe objects in themſelves produce infinite variety; no two rocks or trees are exactly the ſame; they are varied a ſecond time by combination; and almoſt as much a third time by different lights and ſhades and other ſerial effects. Sometimes we find among them the exhibition of a whole, but oftener we find only beautiful parts."

Sublimity or grandeur alone cannot make an object pictureſque: for, as our author remarks, "however grand the mountain or the rock may be, it has no claim to this epithet, unleſs its form, its colour, or its accompaniments, have ſome degree of beauty. Nothing can be more ſublime than the ocean; but wholly unaccompanied, it has little of the pictureſque. When we talk therefore of a ſublime object, we always underſtand that it is alſo beautiful; and we call it ſublime or beautiful only as the ideas of ſublimity or ſimple beauty prevail. But it is not only the form and the compoſition of the objects of landſcape which the pictureſque eye examines, it connects them with the atmosphere, and ſeeks for all thoſe various effects which are produced from that vaſt and wonderful ſtorehouſe of nature. Nor is there in travelling a greater pleaſure than when a ſcene of grandeur burſts unexpectedly upon the eye, accompanied with ſome accidental circumſtance of the atmosphere which harmonizes with it, and gives it double value."

There are few places ſo barren as to afford no pictureſque ſcene.

— — — Believe the muſe,
She does not know that inſipidious ſpot
Where beauty is thus niggard of her ſtore.
Believe the muſe, through this terreſtrial waſte
The ſeeds of grace are ſown; roſutely ſown,
Even where we leaſt may hope. —

Mr Gilpin mentions the great military road between Newcaſtle and Carlisle as the moſt barren tract of country in England; and yet there, he ſays, there is "always ſomething to amuſe the eye. The interchangeable patches of heath and green-ſward make an

agreeable variety. Often too on theſe vaſt tracts of interſecting grounds we ſee beautiful lights, ſoftening off along the ſides of hills; and often we ſee them adorned with cattle, ſlocks of ſheep, heath-cocks, grouſe, plover, and flights of other wild-fowl. A group of cattle ſtanding in the ſhade on the edge of a dark hill, and relieved by a lighter diſtance beyond them, will often make a complete picture without any other accompaniment. In many other ſituations alſo we find them wonderfully pleaſing, and capable of making pictures amidſt all the deficiencies of landſcape. Even a winding road itſelf is an object of beauty; while the richneſs of the heath on each ſide, with the little hillocks and crumbling earth, give many an excellent leſſon for a fore ground. When we have no opportunity of examining the grand ſcenery of nature, we have every where at leaſt the means of obſerving with what a multiplicity of parts, and yet with what general ſimplicity, ſhe covers every ſurface.

"But if we let the imagination looſe, even ſcenes like theſe adminiſter great amuſement. The imagination can plant hills; can form rivers and lakes in valleys; can build caſtles and abbey; and if it find no other amuſement, can create itſelf in vaſt ideas of ſpace."

Mr Gilpin, after deſcribing ſuch objects as may be called pictureſque, proceeds to conſider their ſources of amuſement. We cannot follow our ingenious author through the whole of this conſideration, and ſhall therefore finiſh our article with a ſhort quotation from the beginning of it. "We might begin (ſays he) in moral ſtyle, and conſider the objects of nature in a higher light than merely as amuſement. We might obſerve, that a ſearch after beauty ſhould naturally lead the mind to the great origin of all beauty; to the

— — — firſt good, firſt perfect, and firſt fair.

But though in theory this ſeems a natural climax, we inſiſt the leſs upon it, as in fact we have ſcarce ground to hope that every admirer of pictureſque beauty is an admirer alſo of the beauty of virtue; and that every lover of nature reflects, that

Nature is but a name for an *effect*,
Whoſe *cauſe* is God. — — —

If, however, the admirer of nature can turn his amuſements to a higher purpoſe; if its great ſcenes can inſpire him with religious awe, or its tranquil ſcenes with that complacency of mind which is ſo nearly allied to benevolence, it is certainly the better. *Appenas lucro.* It is ſo much into the bargain; for we dare not promiſe him more from pictureſque travel than a rational and agreeable amuſement. Yet even this may be of ſome uſe in an age teeming with licentious pleaſure; and may in this light at leaſt be conſidered as having a moral tendency."

PICUPINIM, in ornithology, is the name of a ſpecies of pigeon in Brazil. It is ſo very ſmall as ſcarce to exceed the lark in ſize. Its head, neck, and wings, are of a pale lead colour, with a black ſemilunar mark at the extremity of each wing; but its long wing-feathers, which are ſeen when the wings are expanded in flying, are of a reddiſh brown on one ſide, and blackiſh on the other, with black ends or tips; the tail is

Pictureſque
Beauty.
Picupini-
ma.

Picumus, long, and is variegated with black, white, and brown; the belly is covered with white feathers, every one of which has a brown mark of the shape of a half moon at the end.

PICUMNUS and **PILUMNUS**, were two deities at Rome, who presided over the auspices required before the celebration of nuptials. **Pilumnus** was supposed to patronize children, as his name seems in some manner to indicate *quod pectat mala infantum*. The manuring of land was first invented by **Picumnus**, from which reason he is called *Sterquilinus*. **Pilumnus** is also invoked as the god of bakers and millers, as he is said to have first invented the art of grinding corn.

PICUS, the **WOODPECKER**, in ornithology, a genus belonging to the order of *picæ*. The beak is straight, and consists of many sides, and like a wedge at the point; the nostrils are covered with bristly feathers; the tongue is round like a worm, very long, and sharp at the point, which is beset with bristles bent backwards.

The grand characteristic, says Latham, of these birds is the tongue (which in no bird is similar, the wryneck excepted, whose other characters, however, differ too widely to give it place in this class), the muscles necessary to the motions of which are singular and worthy of notice; affording the animal means of darting it forwards the whole length, or drawing it within the mouth at will. See *Ray on the Creation*, p. 143. *Derham's Physic. Theol.* p. 342. Note c. *Will. Orn.* p. 136. t. 21.

The same intelligent ornithologist enumerates no less than 50 different species of woodpeckers, besides varieties of some of them which amount to nine more. Each of these species our readers cannot expect us to describe; we shall therefore content ourselves with such as appear to be most remarkable.

1. The *picus martius*, or greatest black woodpecker, is about the size of a jackdaw, being about 17 inches long; the bill is nearly two inches and a half in length, of a dark ash colour, and whitish on the sides; the irides are pale yellow, and the eyelids are naked, according to Scopoli: the whole bird is black, except the crown of the head, which is vermillion; the first quill-feather is the shortest, and the two middle tail-feathers, which are longer than the others, make it appear a little rounded; the legs are of a lead colour, covered with feathers on the fore part for half their length.

The female differs from the male in having the hind head only red, and not the whole crown of the head; and the general colour of the plumage has a strong cast of brown in it. It has likewise been observed, that the red on the hind head has been wholly wanting; and indeed both male and female are apt much to vary in different subjects; some having a much greater proportion of red on the head than others. This species is found on the continent of Europe, but not in plenty except in Germany. It is not an inhabitant of Italy, and is very rarely seen in France. Frisch mentions it as a bird common to his parts; and it is found also in Sweden, Switzerland, and Denmark, but not in winter.

"It is said to build in old ash and poplar trees, making large and deep nests; and Frisch observes, that they often so excavate a tree, that it is soon after blown

down with the wind; and that under the hole of this bird may often be found a bushel of dust and bits of wood. The female lays two or three white eggs, the colour of which, as Willoughby observes, is peculiar to the whole of the woodpecker genus, or at least all those which have come under his inspection."

2. The *picus principalis*, or white-bellied woodpecker, is somewhat bigger than the last, being equal in size to a crow. It is 16 inches long, and weighs about 20 ounces. The bill is white as ivory, three inches long, and channelled; the irides are yellow, and on the hind head is an erect pointed crest, of a fine red colour, some of the feathers of which are two inches long; the head itself, and the body in general, are black; but the lower part of the back, rump, and upper tail-coverts, are white; from the eye there arises a stripe of white, which passes on each side of the neck down to the back; three or four of the prime quills are black, but the rest are white; the tail is cuneiform, and of the same colour as the body; the legs and claws are also black.

"This species inhabits Carolina, Virginia, New Spain, and Brasil, and is called by the Spaniards *carpenter*, and not without reason, as this as well as most of the other species make a great noise with the bill against the trees in the woods, where they may be heard at a great distance, as if carpenters were at work, making, according to Catelby, in an hour or two a bushel of chips. He adds likewise, that the Canadian Indians make use of the bills of these birds for cornets, setting them round in a wreath with the points outwards; and that the northern Indians purchase them of the southern at the rate of two and three buckskins per bill. Kalm says they are found in New Jersey, though very seldom, and only at certain seasons."

3. The *picus erythrocephalus*, or red-headed woodpecker, is about eight inches three quarters long, and weighs two ounces. The bill is an inch and a quarter in length, of a lead colour, with a black tip; the irides are dusky; the head and the neck are of a most beautiful crimson; the back and wings are black; the rump, breast, and belly, are white; the ten first quills are black, the eleventh black and white, and the others are white with black shafts; the tail is black and cuneiform; the legs and claws are of lead colour. The cock and hen are very nearly alike.

"This species inhabits Virginia, Carolina, Canada, and most of the parts of North America; but at the approach of winter it migrates more or less to the southward, according to the severity of the season; and upon this circumstance the people of North America foretel the rigour or clemency of the ensuing winter. Kalm observes that it is a very common bird, and is very destructive to the maize-fields and orchards, pecking through the ears of maize, and destroying great quantities of apples. In some years they are more numerous than in others, when they attack the orchards where the sweet apples grow, which they eat so far that nothing remains but the mere pills. Some years since there was a premium of twopence per head paid from the public fund, in order to extirpate this pernicious bird; but this has been neglected much of late. They are said likewise to be very fond of acorns. In Virginia and Carolina they stay the whole year, but are

Picus. are not seen in such numbers in winter as in summer. During the winter they are very tame, and are frequently known to come into the houses in the same manner as the redbreast is wont to do in England. It is observed that this species is found chiefly in old trees; and the noise they make with their bills may be heard above a mile distant. It builds the earliest of all the woodpeckers, and generally pretty high from the ground. It is accounted by many people very good eating. Buffon is of opinion, that it is necessity alone that causes these birds to feed on vegetables of any kind, as it is contrary to the nature of the genus."

4. The *picus pubescens*, or little woodpecker, according to Catesby, weighs only about an ounce and an half. Brisson says, it is larger than the smallest of our European species, being about five inches and a half long. The bill is about eight lines long, and of a horn colour; the top of the head is black, and on each side above the eye is a white line; the hind head is red; the hind part of the neck, the back, and rump, are black, which is divided into two parts by a line of white passing down the middle to the rump; the scapulars, upper wing and tail coverts, are black; the greater wing coverts and quills are spotted with white; the under parts of the body are pale grey; the tail is black; the four middle feathers are plain, the rest are barred with white and black; and the legs and claws are black.

The female has no red on the hind head. Linnæus tells us, that the outer tail feather is white, marked with four black spots. This species inhabits Virginia and Carolina. According to Kalm, it abounds in New Jersey, where it is esteemed of all others the most dangerous to orchards, and is the most daring. As soon as it has pecked one hole in a tree, it makes another close to the first, in an horizontal direction, proceeding till it has made a circle of holes quite round the tree; and the apple trees in the orchards have often several of these rings of holes round the stem, in such manner that the tree frequently dries up and decays.

5. The yellow woodpecker is about nine inches long. The bill is of a yellowish white, and more than an inch long; the hind head is crested; the head itself, the neck, and whole body, are covered with dirty white feathers; from the lower jaw to the ears, on each side, there is a red stripe; the wing coverts are brown and edged with yellowish, and some of the greater ones are mixed with rufous on the inner web; the quills are brown or rufous; the tail is black; the legs and claws are grey.

"This species is common at Cayenne, and is called there *charpentier jaune*. It makes its nest in old trees which are rotten within; making with its bill a hole from without, at first horizontal, but declining down-

wards as soon as it has pierced through the sound part, till it is at last a foot and a half below the first opening. The female lays three white and nearly round eggs, and the young are hatched about the beginning of April. The male bears his share in the work with the female, and in her absence keeps sentinel at the entrance of the hole. The note of this bird is a kind of whistle six times repeated, of which the two or three last are in a graver accent than the others. The female wants the red band on the side of the head which is seen in the male.

"Specimens vary; some are of that dirty white, as Brisson describes it, others of a light yellow; which last is the case in a specimen in the Leverian museum: this is 13 inches in length.

"In the place referred to above, we find a bird imperfectly described by Mr Fermin: he merely says, that it is a large species; that it has a fine red crest on the head; the neck, breast, and belly, of a citron colour; and the wings bluish above. He only adds, that it may be distinguished from others by the strokes of the bill, which it gives to the trees, and may be heard at a great distance."

6. The *picus auratus*, or gold-winged woodpecker, is about 11 inches long, and weighs about 5 ounces. The bill is an inch and a half long, and is somewhat bent, and is not square but roundish, ridged only on the top, the point being sharp; the upper parts of the head and neck are ash-coloured; the hind head is red; the sides of the head, throat, and fore part of the neck, are pale yellow; on each side of the head is a stripe of black, from the base of the lower jaw to the neck; the back, scapulars, and wing coverts, are of a grey brown colour, transversely striated with black lines; the rump is whitish; the breast, belly, and sides, are whitish yellow, and each feather is marked with a round black spot at the tip; on the middle of the breast there is a large crescent of black; the thighs, upper and under tail coverts, are black and white mixed; the quills are brown, with yellow shafts spotted with brown on the outer edge; the tail is blackish, being outwardly edged with grey; the outer feather is dotted with whitish on the margins; the shafts of all but the two middle feathers are yellow half way from the base; and the legs and claws are brown.

The female differs in having the crown and neck behind grey brown; the hind head of a less vivid red; and the greater quills not spotted on the edges. She also wants the black list on the throat, but otherwise like the male.

This species inhabits Virginia, Carolina, and Canada, and is plenty in New Jersey and about New York, where it is called by some *nutcracker* or *putt*, and by others *high-bird* (A). Both the first names have some relation to

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(A) "I have lately seen (says Latham) in the Leverian museum a bird which appears to be a mere variety, though brought from a far different country. This was much like the *picus auratus* in colour, but rather less in size. The bill exactly made like that bird, and brown; on each side of the jaw is a stripe of crimson like a whicker; the under part of the wings of a pale red colour, not unlike what is called *red head*; and the shafts of the quills and tail, which in the other bird are yellow, in this are red; the plumage on the upper parts of the body is brown, beneath vinaceous, marked with round black spots; tail black, pointed, and each feather bifurcated at the tip, exactly like the American one. This was brought from the Cape of Good Hope. I have seen two specimens of this bird."

its note; and perhaps the latter, from the situation of the nest. It is almost continually on the ground, and is not observed to climb on the trees, like others of the genus. It lives chiefly on insects (a), and is commonly very fat, so as to be thought very palatable for the table. It stays all the year; and as it cannot at all times eat insects, it must perhaps eat some kind of grass or plants in the fields. Its form and some of its qualities make it resemble the cuckoo (c). Though it climbs not on trees, it flies to their tops and sits occasionally on the branches.

Forster, in the Philosophical Transactions, observes, that it is a bird of passage in the northern parts of America, visiting the neighbourhood of Albany Fort in April, and leaving it in September; that it lays from four to six eggs, in hollow trees, and feeds on worms and other insects. Called by the natives *ou-thee-quan-noo*.

The following species are pretty well known in Britain.

7. The *viridis*, or green woodpecker, weighs six ounces and a half; its length is 13 inches, the breadth 20 and a half; the bill is dusky, triangular, and near two inches long; the crown of the head is crimson, spotted with black; the eyes are surrounded with black, and the male has a rich crimson mark beneath the blackness; the back, neck, and lesser coverts of the wings, are green; the rump of a pale yellow; the whole of the under part of the body is of a very pale green, and the thighs and vent are marked with dusky lines; the legs and feet are of a cinereous green; the tail consists of ten stiff feathers, whose ends are generally broken, as the bird rests on them in climbing; their tips are black; the rest of each is alternately barred with dusky and deep green. These birds feed entirely on insects; and their principal action is that of climbing up and down the bodies or boughs of trees: for the first purpose they are provided with a long slender tongue, armed with a sharp bony end barbed on each side, which by the means of a curious apparatus of muscles they can exert at pleasure, darting it to a great length into the clefts of the bark, transfixing and drawing out the insects that lurk there. They make their nests in the hollows of trees: in order therefore to force their way to those cavities, their bills are formed strong, very hard, and wedge-like at the end; Dr Derham observes, that a neat ridge runs along the top, as if an artist had designed it for strength and beauty. Yet it has not power to penetrate a sound tree; their perforation of any tree is a warning to the owner to throw it down. Their legs are short, but

strong; their thighs very muscular; their toes disposed two backward, two forward; the feathers of the tail are very stiff, sharp pointed, and bending downwards. The three first circumstances do admirably concur to enable them to run up and down the sides of trees with great security; and the strength of the tail supports them firmly when they continue long in one place, either where they find plenty of food, or while they are forming an access to the interior part of the timber. This form of the tail makes their flight very awkward, as it inclines their body down, and forces them to fly with short and frequent jerks when they would ascend, or even keep in a line. This species feeds oftener on the ground than any other of the genus: all of them make their nests in the hollows of trees; and lay five or six eggs, of a beautiful semitransparent white.

Willoughby says that the female lays five or six eggs; which Pennant (d) also observes; adding, that they are of a beautiful semitransparent white.

"These birds sometimes build in a hollow asp or other tree, 15 or 20 feet from the ground. The male and female take it by turns to bore through the living part of the wood, till they come to the rotten part, wherein, after being hollowed out to a proper depth, they lay their eggs (e), which are generally five and sometimes six (f) in number, greenish, with small black spots. The young ones climb up and down the trees before they can fly. It is worthy of remark to observe with what nicety the holes of the woodpecker are made, as perfectly round as if made by the assistance of a pair of compasses. Nuthatches, starlings, and bats, frequently build in these holes when deserted.

"Both Frisch and Klem mistake in saying that the females have not the red crown, for even the young ones in the nest have the appearance of it; and I have had them brought to me when they could scarcely fly, when the red was mixed with brown; but they do not become of a full red till after the first moult. They are said to be fond of bees in winter, making great havoc among them. Salerne observes, that they are found in the markets in Italy, at Bologna; but this is not extraordinary, for the Italians eat all small birds almost without exception.

"In Sir A. Lever's museum there is a variety of this bird, of a straw-colour throughout, except the crown, which is faintly marked with red."

8. The major, or great spotted woodpecker, weighs two ounces three quarters; the length is nine inches; the breadth is 16. The bill is one and a quarter long, of a black horn colour. The irides are red. The forehead

(a) "In defect of insects I have been informed (says Mr Latham), that it feeds on the berries of the red cedar, and grows fat on them. This food has been both disgorged by the mouth, after being shot, as well as found in the stomach on dissection."

(c) "Linnaeus, in his tenth edition of the *Systema Naturae*, had ranked this with the cuckoos; and Buffon, from its similarity to this genus, has placed it at the end of the woodpeckers of its class."

(d) *Br. Zool.* p. 242. where some pertinent observations on these birds may be found. Let the reader also consult Ray on the Creation, p. 143. and Derham's *Physico-theol.* p. 193, 339, 342.

(e) "This is sometimes so deep that they must feed their young quite in the dark; for I have been told by one, that he was obliged to thrust his whole arm to the shoulder down the hollow of a tree before he could reach the eggs."

(f) "I have seen six young ones together in one nest." *Will. Orn.* p. 135.

Picus.

head is of a pale buff colour; the crown of the head a glossy black; the hind-part marked with a rich deep crimson spot. The cheeks are white; bounded beneath by a black line that passes from the corner of the mouth and surrounds the hind-part of the head. The neck is encircled with a black colour. The throat and breast are of a yellowish white; the vent feathers of a fine light crimson. The back, rump, and coverts of the tail, and lesser coverts of the wings, are black; the scapular feathers and coverts adjoining to them are white. The quill-feathers are black, elegantly marked on each web with round white spots. The four middle feathers of the tail are black, the next tipped with dirty yellow; the bottoms of the two outermost black; the upper parts a dirty white. The exterior feathers marked on each web with two black spots; the next with two on the inner web, and only one on the other. The legs are of a lead colour. The female wants that beautiful crimson spot on the head; in other respects the colours of both agree. This species is much more uncommon than the preceding; and keeps altogether in the woods. This bird is pretty common in England, France, Germany, and other parts of Europe, frequenting the woods like the rest of its genus, and is likewise met with in America. It is a very cunning bird; for when a person has seen one on a tree, he is almost sure to lose sight of it, if the tree is large, and the observer not very attentive; for the moment it spies any one it will creep behind a branch, and there lie secure till the danger is over. The extreme facility with which birds of the woodpecker kind descend as well as ascend the trees is worthy admiration, seeming to do both with equal ease to itself. We do not find any one who has noticed the colour of the eggs; but Buffon mentions having found a nest with six young ones in an old decayed alder tree, 30 feet from the ground.

9. The medius, or middle-sized woodpecker, agrees with the preceding in colours and size, excepting that the crown of the head in this is of a rich crimson; the crown of the head in the male of the former black; and the crimson is in form of a bar on the hind part. Birds thus marked have been shot in Lancashire and other parts of England; but Mr Pennant is doubtful whether they are varieties, or distinct species. "Brisson (says Latham), quotes many authors who have described this bird, but I am not clear in its being a distinct species. It is certainly much more scarce in England than any other. Buffon is reconciled to its being a variety only; but if so, this variety is regular, at least, in all the specimens which I have seen."

10. The minor, or least spotted woodpecker, scarce weighs an ounce: the length is six inches; the breadth eleven. The forehead is of a dirty white: the crown of the head (in the male) of a beautiful crimson: the cheeks and sides of the neck are white, bounded by a band of black beneath the former. The hind part of the head and neck, and the coverts of the wings, are black: the back is barred with black and white: the scapulars and quill feathers spotted with black and white: the four middle feathers of the tail are black; the others varied with black and white: the breast and belly are of a dirty white: the crown of the head (in the female) is white; the feet are of a lead colour. It has all the characters and actions of the greater kind,

but is not so often met with. Salerne tells us that this bird is not found in France; but Buffon affirms that it inhabits most of the provinces there. It approaches near habitations in winter, and may be seen in orchards adjoining to houses, which no doubt it does for the sake of food, finding about the trunks of the trees both caterpillars and larvæ of insects of all kinds. It builds in an hole of a tree, and often disputes the right of possession with the little molemouse, which last, as it is much weaker of the two, must yield the victory. Willoughby says it is called in England by the name of *hickwall*. Linnæus, in his *synonymes* of this bird, quotes Hæsselquist for the same; but whoever will diligently read what this author says on the matter, will be convinced that the reference should be to the greater rather than the least of this genus. It is said by him to inhabit the higher parts of Asia.

Mr Sonnerat mentions a bird found by him at Antigue, in the island of Panay, with the top of the head, and hind part of the neck, of a greyish black; on each side of the neck, two-thirds downwards, is a stripe of white, which begins just above the eye; and under this another of black from the eye to the shoulder. The upper part of the body is black and white. The under parts pale yellow, spotted with black. The tail is black above, and beneath barred with a dirty white and yellowish colour. The bill and legs blackish. The head had no red on it. Buffon supposes it to have been a female, and a variety only of our least spotted woodpecker.

Picus (fab. hid.), a king of Latium, son of Saturn. He married Venilia, also called Canens, by whom he had Faunus. He was tenderly loved by the goddess Pomona, and he returned her affection. As he was one day hunting in the woods, he was met by Circe, who became deeply enamoured of him, and who changed him into a woodpecker, called by the name of *picus* among the Latins. His wife Venilia was so disconsolate when she was informed of his death, that she pined away. Some suppose that Picus was the son of Pilumnus, and that he gave out prophecies to his subjects by means of a favourite woodpecker; from which circumstance originated the fable of his being metamorphosed into a bird.

Picus (John), earl of Mirandola, a prodigy of parts and learning, was the youngest child of John Francis Picus earl of Mirandola and Concordia; and was born in the year 1463. The progress that he made in letters was so extremely rapid, that it was matter of astonishment to see even a boy one of the first poets and orators of his age. He was the scholar of R. Jochanan, a German Jew, who confirmed his natural fondness for the cabalistical writings, inasmuch that he is reported to have declared, that those who dived into them dived in the true head spring; whereas those rivulets that had flowed thence into Greece were no better than corrupt and stagnated waters. After visiting the most famous universities of France and Italy, he went to Rome; where, in 1486, before he was 24 years of age, he published 900 propositions in logic, mathematics, physics, divinity, cabalistic learning, and magic, drawn not only from Greek and Latin, but even from Jewish and Arabian writers: subjoining to his advertisement, that, "if any philosopher or divine would come to Rome to dispute with him

Picus.

Picus
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Pieces.

him upon any or all of them, he would defray the expenses of his journey from the remotest corners of Italy." He enjoyed, however, the honour of this disputitious challenge quietly, without danger to his credit: for envy procured some of his propositions to be charged with heresy, and he was forced to dispute upon them. As a proof of the ignorance of his opposers, we are told that a theologian who had shown himself very zealous in censuring his book, being asked what was the meaning of the word *cabbala*? answered, that he was a wicked man and a heretic, who had written against Jesus Christ, and that those who followed his opinion were called cabbalists. At the age of 28, he confined himself wholly to the study of the scriptures; and undertook to combat the Jews and Mahometans, as well as to confound judicial astrology; but in this intention his credit was also saved, though with the loss of his life, by his dying in 1494, in his 32d year. He was called the *phoenix of his age*, and by Scaliger *Monstrum sine Vitio*. He composed a great number of works, which have often been printed both separately and together. The following epitaph is upon his tomb:

*Hic situs est Picus Mirandola, cetera norunt
Et Tagus et Ganges, forsitan et Antipodes.*

PICUS (John Francis), prince of Mirandola, nephew of John Picus mentioned above, was born about the year 1469. He cultivated learning and the sciences after the example of his uncle; but he had a principality and dominions to superintend, which involved him in great troubles, and at last cost him his life. He was twice driven from his principality, and twice restored; and at last, in 1533, was, together with his eldest son Albert, assassinated in his own castle by his nephew Galeotti. He was a great lover of letters; and such of his works as were then composed were inserted in the Strasburgh edition of his uncle's in 1504, and continued in future impressions, besides some others which were never collected.

PIECE, in matters of money, signifies sometimes the same thing with species; and sometimes, by adding the value of the pieces, it is used to express such as have no other particular name. For the piece of eight, or piastre, see *MONEY-Table*.

PIECE, is also a kind of money of account, or rather a manner of accounting used among the negroes on the coast of Angola in Africa, See *MONEY-Table*.

PIECE, in heraldry, denotes an ordinary or charge. The honourable pieces of the shield are the chief, fess, bend, pale, bar, cross, saltier, chevron, and in general all those which may take up one-third of the field, when alone, and in what manner soever it be. See *HERALDRY*.

PIECES, in the military art, include all sorts of great guns and mortars. Battering pieces are the larger sort of guns used at sieges for making the breaches; such are the 24-pounder and culverine, the one carrying a 24 and the other an 18 pound ball. Field-pieces are 12-pounders, demiculverines, 6-pounders, sakers, minions, and 3-pounders, which march with the army, and encamp always behind the second line, but in day of battle are in the front. A soldier's firelock is likewise called his *piece*.

PIEDMONT, a country of Italy, with the title of a principality, is bounded on the north by Savoy and Italy; on the west by France; on the south by the Mediterranean and the republic of Genoa; and on the east by the duchies of Montserrat and Milan; extending about 150 miles from north to south, but much less from east to west. It is called Piedmont, and in Latin *Piedmontium*, from its situation at the foot of the mountains, or Alps, which separate France from Italy. This country is in some parts mountainous, but is everywhere very fruitful. The plains produce fine corn, and Montserrat and the Milanese yield great quantities of Turkey wheat, which commonly serves for bread, and with which the people of the middle rank mix rye; the pods are used for fuel, and the stalks being thick serve to mend the roads. The hills produce plenty of wine, which, like the Italian wines, is very luscious when new, especially the white. There is also a tartish red wine called *vino brusco*, said to be very wholesome for fat people, and, on the other hand, the sweet wine is recommended as a stomachic. The neighbourhood of Turin is famous for its fine fruits, and many long walks of chestnut and mulberry trees, which produce both pleasure and profit. Marons, or large chestnuts, are a favourite dainty among the common people. These are put into an oven, and, when thoroughly hot, and cooled in red wine, are dried a second time in the oven, and afterwards eaten cold. Truffles grow here in such abundance, that Piedmont has obtained the name of the *truffle country*. Some are black, others white marbled with red. Their price is rated according to their size. Sometimes they are found of 12 or 14 pounds weight; and many country people earn from 60 to 70 dollars a-year merely by digging for them. The trade in cattle is said to bring into Piedmont no less than three millions of livres per annum. The cultivation of silk is also a profitable article, the Piedmontese silk being, on account of its fineness and strength, esteemed the best in Italy. The Piedmontese gentry breed vast numbers of silk-worms under the care of their tenants, who have the eggs and mulberry leaves delivered to them, and in return they give half the silk to their masters. This principality comprehends eleven small provinces: Piedmont proper, the valleys between France and Italy, the valley of Saluzza, the county of Nice, the marquisate of Susa, the duchy of Aost, the Canavese, the lordship of Vercelli, the county of Asti, and the Langes. It was formerly a part of Lombardy, but now belongs to the king of Sardinia, and lies at the foot of the Alps, which separate France from Italy. It contains many high mountains, among which there are rich and fruitful valleys, as pleasant and populous as any part of Italy. In the mountains are mines of several kinds, and the forests afford a great deal of curious game, among which the *tumor* is an useful animal. "The mules (says Mr Watkins) are very fine in this country; but the inhabitants have other beasts, or rather monsters, which they find very serviceable, though vicious and obstinate. These are produced by a cow and an ass, or mare and bull, and called *jumarres* or *gimerri* (A). I cannot say that I have ever seen any of them, but I am told they are very common."

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(A) These equivocal animals, however, if we may so term them, are so generally mentioned by travellers in this

Piedmont. The Piedmontese have more sense than the Savoyards, but then they are not so sincere. Some authors represent them as lively, artful, and witty, the inhabitants of the mountain of Aosta excepted, who are farther distinguished by large wens, as even their horses, dogs, and other animals. Mr Baretti, however, in his *Account of Italy*, vol. ii. p. 116. gives the following account of them. "One of the chief qualities (says he), which distinguish the Piedmontese from all other Italians, is their want of cheerfulness. Piedmont never produced a single good poet, as far as the records of the country can go, whereas there is no other province of Italy but what can boast of some poet ancient or modern; and yet the Piedmontese are not deficient in several branches of learning, and some of them have succeeded tolerably well in civil law, physic, and the mathematics. It is likewise observed of this people, that none of them ever attained to any degree of excellence in the polite arts, and it is but lately that they can boast of a painter, Cavaliero Bamente; a statuary, Signor Lodetto; and some architects, Conte Alfieri, Signor Borra, and others, who yet, to say the truth, are far inferior to numberless artists produced by the other provinces of Italy. They have, on the other hand, greatly advanced when considered as soldiers; though their troops have never been very numerous, every body conversant in history knows the brave stand they made for some centuries past against the French, Spaniards, and Germans, whenever they have been invaded by these nations. The skill of the Piedmontese in fortification is likewise very great, and their Bertolas and Pintos have shown as much genius as the Vaubans and Cohorns, in rendering impregnable several places which inferior engineers would only have made secure."

Payne's
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vol. II. The chief trade of this principality consists in hemp and silk. Indeed, so great is their trade in raw silk, that the English alone have purchased to the value of 200,000 lb. in a year. The silk worm thrives so well, that many peasants make above (s) 100 lb. of silk annually; and it is not only abundant, but universally known to be stronger and finer than any in Italy. The land owners divide the profit with their tenants. The Piedmontese workmen, however, are said to want expertness, though they finish their work equally well with those of other nations. The high duty and land-carriage on mules likewise tend to lessen the value of this trade. They have besides corn, rice, wine, fruits, flax, and cattle.

In the valleys of Lucerne, Peyrouse, and St Martin, which have always belonged to Piedmont, live the celebrated Waldenses or Vaudois, a name which signifies *people of the valleys*. These have rendered themselves famous in history for their dissent from the Romish church long before the time of Luther and Calvin, and for the persecutions they have suffered on that account; but since the year 1730 they have not been openly molested.

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left for their religion, but, in order to suppress them by degrees, a popish church has been built in every parish. They are heavily taxed, and labour under great oppressions. The number of people in these valleys scarce at present exceeds 10,000, of which 1000 are Catholics. The chief river of Piedmont is the Po, which flows out of Mount Vifo. The river Sesia, the Doria, Baltea, the ancient Druria, the Tenaro, and several others, run into it. The Var, anciently called the Varus, rises in the county of Nice, and after watering it empties itself into the Mediterranean. The language of the Piedmontese is a mixture of French and Italian. In this country are about 50 earldoms, 15 marquisates, a multitude of lordships, and 20 abbeys. Though the country be entirely popish, except some valleys inhabited by the Waldenses, the king reserves to himself the greatest part of the power in church affairs, which in many other places is given up to the pope, and the constitution *unigenitus* is here universally opposed. Towards the end of the last century, the French king persuaded the duke of Savoy to drive them out of the country; in consequence of which 200,000 of them retired to Germany, England, and Holland, and yet they are not all extirpated, though, as we have observed, they are obliged to have a Roman Catholic church in every parish.

Turin, the general residence of the king of Sardinia, to whom this principality belongs, is the chief city. See **TURIN**. The number of inhabitants, Mr Watkins says, in Piedmont and Savoy, amount to 2,695,727 souls, of which Turin contains about 77,000.

PIENES, a small island of Japan, over against the harbour of Saccai, is famed not only for the beauty of its walks, to which crowds of people resort from the city, but for a deity worshipped there, to which vast numbers of persons devote themselves. They go from his temple to the sea side, where they enter into a boat provided for the purpose; then, launching into the deep, they throw themselves overboard, loaded with stones, and sink to the bottom. The temple of that deity, which is called Canon, is very large and lofty, and so are many others in the city itself; one in particular, dedicated to the gods of other countries, is thought the finest in the whole empire.

PIEPOUDRE (*Court of*), the lowest, and at the same time the most expeditious, court of justice known to the law of England. It is called **PIEPOUDRE**, (*curia pedis pulverizati*), from the dusty feet of the suitors; or, according to Sir Edward Coke, because justice is there done as speedily as dust can fall from the foot: Upon the same principle that justice among the Jews was administered in the gate of the city, that the proceedings might be the more speedy, as well as public. But the etymology given us by a learned modern writer is much more ingenious and satisfactory; it being derived, according to him, from *piepoudreux*,

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this part of Europe, that we have no doubt of their existence, nor of their being found hardy and serviceable as labourers.

(B) Each pound is valued in Piedmont at 18 s. The little village of La Tour, in the valley of Lucerne, makes above 50,000 lb. annually, and the exports every year to the single city of Lyons amount to more than 160,000 l. Sterling.

Pienas,
Piepodre.

Pier
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Pierino.

puldreus, "a pedlar," in old French, and therefore signifying the court of such petty chapmen as resort to fairs or markets. It is a court of record, incident to every fair and market; of which the steward of him who owns or has the toll of the market is the judge. It was instituted to administer justice for all commercial injuries done in that very fair or market, and not in any preceding one. So that the injury must be done, complained of, heard, and determined, within the compass of one and the same day, unless the fair continues longer. The court hath cognizance of all matters of contract that can possibly arise within the precinct of that fair or market; and the plaintiff must make oath that the cause of an action arose there. From this court a writ of error lies, in the nature of an appeal, to the courts at Westminster. The reason of its institution seems to have been, to do justice expeditiously among the variety of persons that resort from distant places to a fair or market; since it is probable, that no other inferior court might be able to serve its process, or execute its judgments, on both or perhaps either of the parties; and therefore, unless this court had been erected, the complaint must necessarily have resorted even in the first instance to some superior judicature.

PIER, in building, denotes a mass of stone, &c. opposed by way of fortress to the force of the sea, or a great river, for the security of ships that lie at harbour in any haven.

Piers of a Bridge. See BRIDGE.

PIERCEA. See RIVINIA.

PIERIA (anc. geog.), a district of Macedonia, contained between the mouths of the rivers Ludias and Peneus; extended by Strabo beyond the Ludias, to the river Axios on the north, and on the south no farther than the Aliacmon, along the west side of the Sinus Thermaicus.—Another *Pieria* of Syria, the north part of Seleucia, or the *Antiochena*, situated on the Sinus Issicus, and lying next Cilicia to the north-west.

PIERIDES, in fabulous history, the daughters of Pierus a Macedonian prince, presuming to dispute with the Muses for the prize of poetry, were turned into magpies. The name of *Pierides* was also given to the mules, from mount Pieris in Thessaly, which was consecrated to them; or, according to others, from Pierus, a Thessalian poet, who was the first who sacrificed to them. See PIERIS.

PIERINO DEL VAGA, an eminent Italian painter, born of poor parents in Tuscany, about the year 1500. He was placed apprentice with a grocer in Florence, and got some instructions from the painters to whom he was sent with colours and pencils; but a painter named *Vaga* taking him to Rome, he was called *Del Vaga*, from living with him, his real name being *Bonnacorsi*. He studied anatomy with the sciences necessary for his profession; and had somewhat of every thing that was good in his compositions. After Raphael's death, he joined with Julio Romano and Francisco Penni to finish the works in the Vatican which were left imperfect by their common master; and to confirm their friendship married Penni's sister. He gained the highest reputation by his performances in the palace of prince Doria at Genoa; but the multiplicity of his business, and the vivacity of his imagination, drained his spirits in the flower of his age; for he

died in the year 1547. Of all Raphael's disciples, Pierino kept the character of his master longest, i. e. his exterior character and manner of designing; for he fell very short of the fineness of Raphael's thinking. He had a particular genius for the decoration of places according to their customs. His invention in that kind of painting was full of ingenuity; grace and order are everywhere to be met with, and his dispositions, which are ordinary in his pictures, are wonderful in his ornaments: some of these he has made little; and some great, and placed them both with so much art, that they set off one another by comparison and contrast. His figures are disposed and designed according to Raphael's gusto; and if Raphael gave him at first some slight sketches of ornaments, as he did to Giovanni d'Uline, he executed them to admiration. The tapestries of the seven planets, in seven pieces, which Pierino designed for Diana de Poitiers, and which were, when De Piles wrote, with Monsieur the first president at Paris, shows sufficiently what he was, and that the above character does not exceed the truth.

PIERIS (anc. geog.), a mountain which is thought to have given name to Pieria of Macedonia; taking its name from Pierus a poet, who was the first that sacrificed to the Muses, thence called *Pierides*, if credit may be given to an ancient scholiast on Juvenal.

PIERRE D'AUTOMNE is a French name, translated from the Chinese, of a medicinal stone, celebrated in the east for curing all disorders of the lungs. Many imagine it had its name of the autumn-stone from its being only to be made at that season of the year; but it may certainly be made equally at all times. The Chinese chemists refer the various parts of the body to the several seasons of the year, and thus they refer the lungs to autumn. This is evident in their writings, and thus the stone for diseases of the lungs came to be called *autumn stone*. It is prepared as follows: They put 30 pints of the urine of a strong and healthy young man into a large iron pot, and set it over a gentle fire. When it begins to boil, they add to it, drop by drop, about a large tea-cup full of rape oil. They then leave it on the fire till the whole is evaporated to a thick substance like black mud. It is then taken out of the pot, and laid on a flat iron to dry, so that it may be powdered very fine. This powder is moistened with fresh oil, and the mass is put into a double crucible, surrounded with coals, where it stands till it be thoroughly dried again. This is again powdered, and put into a china vessel, which being covered with silk cloth and a double paper, they pour on it boiling water, which makes its way, drop by drop, through these coverings, till so much is got in as is sufficient to reduce it to a paste. This paste is well mixed together in the vessel it is kept in, and this is put into a vessel of water, and the whole set over the fire. The matter thus becomes again dried in *balneo marie*, and is then finished. *Observ. sur les Cout. de l'Asie*, p. 258.

PIERRE (St), is a large river in North America, scarcely inferior to the Rhine or the Danube, and navigable almost to its source. Together with many other large streams, it falls into the great river Mississippi.

PIERRE (St), or *St Peter's*, the capital of Martinico, was built in 1665, in order to overawe the mutineers

Pieris,
Pierre.

Pierre
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Piety.

neers of the island who rebelled against its proprietors, the second West India company, who were at the same time the proprietors of all the French Antilles. It is situated on the western side of the island. The town extends along the shore, and a battery that commands the road is erected on the west side, which is washed by the river Royolan, or St Peter. The town is divided into three wards; the middle, which is properly St Peter's, begins at the fort, and runs westward to the battery of St Nicholas. Under the walls of the second ward ships at anchor ride more securely than under the fort, on which account this ward is called the *Anchorage*. The third ward, called the *Gallery*, extends along the sea side from Fort St Peter to the Jesuits' River, and is the most populous part of the city. The houses of St Peter's ward are neat, commodious, and elegant, particularly those of the governor of the island, the intendant, and the other officers. The parish church of St Peter is a magnificent stone building which belonged to the Jesuits, with a noble front of the Doric order. The church of the Anchorage, which belongs to the Jacobine friars, is likewise of stone. It is a place of considerable trade, and is built with tolerable regularity. The houses are mostly constructed of a grey pumice-stone or lava, which is found on the strand; and the high-street is, according to Dr Isert, above an English mile in length. It is supposed to contain about 2000 houses, and 30,000 inhabitants, including negroes. St Pierre, with the whole of the flourishing island of Martinico, was taken from the French in the month of March 1794, by the British land and sea forces under the command of Sir Charles Grey and Sir John Jervis, and will now, we presume, continue annexed to the British crown: 125 vessels loaded with the produce of the island, and of great value, were captured, 71 of which were in the harbour of St Pierre.

PIETISTS, a religious sect sprung up among the Protestants of Germany, seeming to be a kind of mean between the Quakers of England and the Quietists of the Romish church. They despise all sorts of ecclesiastical polity, all school theology, and all forms and ceremonies, and give themselves up to contemplation and the mystic theology. Many gross errors are charged on the Pietists, in a book intitled *Manipulus Observationum Antipietisticarum*; but they have much of the air of polemical exaggeration, and are certainly not at all just. Indeed there are Pietists of various kinds: Some running into gross illusions, and carrying their errors to the overturning of a great part of the Christian doctrine, while others are only visionaries; and others are very honest and good, though perhaps misguided, people. They have been disgusted with the coldness and formality of other churches, and have thence become charmed with the fervent piety of the Pietists, and attached to their party, without giving into the grossest of their errors. See *Mosheim's Ecl. History*, vol. iv. p. 454.

PIETISTS, otherwise called the *Brethren and Sisters of the Pious and Christian Schools*, a society formed in the year 1678 by Nicholas Barre, and obliged by their engagements to devote themselves to the education of poor children of both sexes.

PIETOLA, anciently called *Andes*, is a place within two Italian miles of Mantua, famous for being the birth-place of Virgil.

PIETY, is a virtue which denotes veneration for the

Deity, and love and tenderness to our friends. This distinguished virtue, like many others, received among the Romans divine honours, and was made one of their gods. Acilius Glabrio first erected a temple to this divinity, which he did upon the spot on which a woman had fed with her own milk her aged father, who had been imprisoned by order of the senate, and deprived of all aliments. The story is well known, and is given at length in authors which are in the hands of every school-boy. See *Cicero de div.* 1. and *Valerius Maximus*, 5. c. 4. and our article *FILIAL Piety*, p. 238. col. 2d.

If piety was thus practised and thus honoured in Heathen antiquity, it surely ought not to be less so among Christians, to whom its nature is better defined, and to the practice of which they have motives of greater cogency. A learned and elegant writer has said that the want of piety arises from the want of sensibility; and his observations and arguments are so just and so well expressed, that we cannot do better than transcribe them.

“It appears to me (says Dr Knox), that the mind of man, when it is free from natural defects and acquired corruption, feels no less a tendency to the indulgence of devotion than to virtuous love, or to any other of the more refined and elevated affections. But debauchery and excess contribute greatly to destroy all the susceptible delicacy with which nature usually furnishes the heart; and, in the general extinction of our better qualities, it is no wonder that so pure a sentiment as that of piety should be one of the first to expire.

“It is certain that the understanding may be improved in a knowledge of the world, and in the arts of succeeding in it, while the heart, or whatever constitutes the seat of the moral and sentimental feelings, is gradually receding from its proper and original perfection. Indeed experience seems to evince, that it is hardly possible to arrive at the character of a complete man of the world, without losing many of the most valuable sentiments of uncorrupted nature. A complete man of the world is an artificial being; he has discarded many of the native and laudable tendencies of his mind, and adopted a new system of objects and propensities of his own creation. These are commonly gross, coarse, sordid, selfish, and sensual. All, or either of these attributes, tend directly to blunt the sense of every thing liberal, enlarged, disinterested; of every thing which participates more of an intellectual than of a sensual nature. When the heart is tied down to the earth by lust and avarice, it is not extraordinary that the eye should be seldom lifted up to heaven. To the man who spends his Sunday (because he thinks the day fit for little else) in the counting-house, in travelling, in the tavern, or in the brothel, those who go to church appear as fools, and the business they go upon as nonsense. He is callous to the feelings of devotion; but he is tremblingly alive to all that gratifies his senses or promotes his interest.

“It has been remarked of those writers who have attacked Christianity, and represented all religions merely as diversified modes of superstition, that they were indeed, for the most part, men of a metaphysical and a disputatious turn of mind, but usually little distinguished for benignity and generosity. There was,

Piety.

amidst all their pretensions to logical sagacity, a cloudiness of ideas, and a coldness of heart, which rendered them very unfit judges on a question in which the heart is chiefly interested; in which the language of nature is more expressive and convincing, than all the dreary subtleties of the dismal metaphysicians. Even the reasoning faculty, on which we so greatly value ourselves, may be perverted by excessive refinement; and there is an abstruse, but vain and foolish philosophy, which philosophizes us out of the noblest parts of our noble nature. One of those parts of us is our instinctive sense of religion, of which not one of those brutes which the philosophers most admire, and to whose rank they wish to reduce us, is found in the slightest degree to participate.

"Such philosophers may be called, in a double sense, the enemies of mankind. They not only endeavour to entice man from his duty, but to rob him of a most exalted and natural pleasure. Such, surely, is the pleasure of devotion. For when the soul rises above this little orb, and pours its adoration at the throne of celestial Majesty, the holy fervour which it feels is itself a rapturous delight. Neither is this a declamatory representation, but a truth felt and acknowledged by all the sons of men; except those who have been defective in sensibility, or who hoped to gratify the pride or the malignity of their hearts by singular and pernicious speculation.

"Indeed all disputations, controversial and metaphysical writings on the subject of religion, are unfavourable to genuine piety. We do not find that the most renowned polemics in the church militant were at all more attentive than others to the common offices of religion, or that they were actuated by any peculiar degree of devotion. The truth is, their religion centered in their heads, whereas its natural religion is the heart. The heart! confined, alas! in colleges or libraries, unacquainted with all the tender charities of husband, father, brother, friend; some of them have almost forgotten that they possess a heart. It has long ceased to beat with the pulsations of love and sympathy, and has been engrossed by pride on conquering an adversary in the syllogistic combat, or by impotent anger on a defeat. With such habits, and so defective a system of feelings, can we expect that a doctor of the Sorbonne, or the disputing professor of divinity, should ever feel the pure flame of piety that glowed in the bosoms of Mrs Rowe, Mrs Talbot, or Mr Nelson?

"It is however certain, that a devotional taste and habit are very desirable in themselves, exclusive of their effects in meliorating the morals and disposition, and promoting present and future felicity. They add dignity, pleasure, and security to any age: but to old age they are the most becoming grace, the most substantial support, and the sweetest comfort. In order to preserve them, it will be necessary to preserve our sensibility; and nothing will contribute so much to this purpose as a life of temperance, innocence, and simplicity."

Of piety, as it denotes love and tenderness to our friends, there have been many distinguished instances both in ancient and modern times. See *FILIAL Piety*, *FRATERNAL* and *PARENTAL Affection*, &c.

The following example of filial piety in China, ta-

ken from P. Du Halde's description of that country, will not we trust be disagreeable to our readers. "In the commencement of the dynasty of the Tang, Lou-tao-tsong, who was disaffected to the government, being accused of a fault, which touched his life, obtained leave from those who had him in custody, to perform the duties of the Tao to one of his deceased friends. He managed matters so well, that giving his keepers the slip, he fled to the house of Lou Nan-kin, with whom he had a friendship, and there hid himself. Lou Nan-kin, notwithstanding the strict search that was made, and the severity of the court against those who conceal prisoners that have escaped, would not betray his friend. However, the thing coming to be discovered, Lou Nan-kin was imprisoned; and they were just on the point of proceeding against him, when his younger brother presenting himself before the judge, *It is I, Sir, said he, who have hidden the prisoner; it is I who ought to die, and not my elder brother.* The eldest maintained on the contrary, that his younger brother accused himself wrongfully, and was not at all culpable. The judge, who was a person of great sagacity, sifted both parties so effectually, that he not only discovered that the younger brother was innocent, but even made him confess it himself: *It is true, Sir, said the younger all in tears, I have accused myself falsely; but I have very strong reasons for so doing. My mother has been dead for some time, and her corpse is not yet buried; I have a sister also who is marriageable, but is not yet disposed of: these things which my brother is capable of managing, I am not, and therefore desire to die in his stead. Vouchsafe to admit my testimony.* The commissioner gave an account of the whole affair to the court, and the emperor at his solicitation pardoned the criminal."

PIG, in zoology. See SVS.

Guinea-Pig. See MUS.

PIG of lead, the eighth part of a fother, amounting to 250 pounds weight.

PIGANIOL DE LA FORCE (John Aymar de), a native of Auvergne, of a noble family, applied himself with ardour to the study of geography, and of the history of France. With the view of improving himself in this study, he travelled into different provinces; and, in the course of his travels, made some important observations on the natural history, the commerce, the civil and ecclesiastical government of each province. These observations were of great use to him in compiling the works he has left behind him, of which the chief are, 1. An Historical and Geographical Description of France; the largest edition of which is that of 1753, in 15 vol. 12mo. It is the best work which has hitherto appeared upon that subject, though it contains a great number of inaccuracies and even errors. 2. A Description of Paris, in 10 vol. 12mo; a work equally entertaining and instructive, and much more complete than the description given by Germain Brice: besides, it is written with an elegant simplicity. He published an abridgment of it in 2 vol. 12mo. 3. A Description of the Castle and Park of Versailles, Marly, &c. in 2 vol. 12mo: it is very amusing, and pretty well executed. Piganol had also a concern with Abbé Nadal in the Journal of Trevoux. He died at Paris in February 1753, at the age of 80 years. This learned man was as much to be respected for his manners as for his talents. To a profound and varied knowledge

Piety.
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Piganiol.

Pigeon. knowledge he united great probity and honour, and all the politeness of a courtier.

PIGEON, in ornithology. See COLUMBA.

PIGEON-HOUSE is a house erected full of holes within for the keeping, breeding, &c. of pigeons, otherwise called a *dove cote*.

Any lord of manor may build a pigeon-house on his land, but a tenant cannot do it without the lord's licence. When persons shoot at or kill pigeons within a certain distance of the pigeon-house, they are liable to pay a forfeiture.

In order to erect a pigeon-house to advantage, it will be necessary, in the first place, to pitch upon a convenient situation; of which none is more proper than the middle of a spacious court-yard, because pigeons are naturally of a timorous disposition, and the least noise they hear frightens them. With regard to the size of the pigeon-house, it must depend entirely upon the number of birds intended to be kept; but it is better to have it too large than too little; and as to its form, the round should be preferred to the square ones; because rats cannot so easily come at them in the former as in the latter. It is also much more commodious; because you may, by means of a ladder turning upon an axis, easily visit all the nests in the house, without the least difficulty; which cannot so easily be done in a square house. In order to hinder rats from climbing up the outside of the pigeon-house, the wall should be covered with tin plates to a certain height, about a foot and a half will be sufficient; but they should project out three or four inches at the top, to prevent their clambering any higher.

The pigeon-house should be placed at no great distance from water, that the pigeons may carry it to their young ones; and their carrying it in their bills will warm it, and render it more wholesome in cold weather. The boards that cover the pigeon-house should be well joined together, so that no rain may penetrate through it: and the whole building should be covered with hard plaster, and white-washed within and without, white being the most pleasing colour to pigeons. There must be no window, or other opening in the pigeon-house to the eastward; these should always face the south, for pigeons are very fond of the sun, especially in winter.

The nests or covers in a pigeon-house should consist of square holes made in the walls of a size sufficient to admit the cock and hen to stand in them. The first range of these nests should not be less than four feet from the ground, that the wall underneath being smooth, the rats may not be able to reach them. These nests should be placed in quincunx order, and not directly over one another. Nor must they be continued any higher than within three feet of the top of the wall: and the upper row should be covered with a board projecting a considerable distance from the wall, for fear the rats should find means to climb the outside of the house.

M. Duhamel thinks that pigeons neither feed upon the green corn, nor have bills strong enough to search for its seeds in the earth; but only pick up the grains that are not covered, which would infallibly become the prey of other animals, or be dried up by the sun. "From the time of the sprouting of the corn, says he, pigeons live chiefly upon the seeds of wild uncultivated

plants, and therefore lessen considerably the quantity of weeds that would otherwise spring up; as will appear from a just estimate of the quantity of grain necessary to feed all the pigeons of a well stocked dove-house." But Mr Worlidge and Mr Lisle allege facts in support of the contrary opinion. The latter relates, that a farmer in his neighbourhood assured him he had known an acre sowed with peas, and rain coming on so that they could not be harrowed in, every pea was fetched away in half a day's time by pigeons: and the former says, "It is to be observed, that where the flight of pigeons falls, there they fill themselves and away, and return again where they first rose, and so proceed over a whole piece of ground, if they like it. Although you cannot perceive any grain above the ground, they know how to find it. I have seen them lie so much upon a piece of about two or three acres sown with peas, that they devoured at least three parts in four of the seed, which, I am sure, could not be all above the surface of the ground. That their smelling is their principal director, I have observed; having sown a small plat of peas in my garden, near a pigeon-house, and covered them so well that not a pea appeared above ground. In a few days, a parcel of pigeons were hard at work in discovering this hidden treasure; and in a few days more I had not above two or three peas left out of about two quarts that were planted; for what they could not find before, they found when the buds appeared, notwithstanding they were hoed in, and well covered. Their smelling alone directed them, as I supposed, because they followed the ranges exactly. The injury they do at harvest on the peas, vetches, &c. is such that we may rank them among the greatest enemies the poor husbandman meets withal; and the greater, because he may not erect a pigeon-house, whereby to have a share of his own spoils; none but the rich being allowed this privilege, and so severe a law being also made to protect these winged thieves, that a man cannot encounter them, even in defence of his own property. You have therefore no remedy against them, but to affright them away by noises or such like. You may, indeed, shoot at them; but you must not kill them; or you may, if you can, take them in a net, cut off their tails, and let them go; by which means you will impound them: for when they are in their houses, they cannot bolt or fly out of the tops of them, but by the strength of their tails; after the thus weakening of which, they remain prisoners at home."

Mr Worlidge's impounding the pigeons reminds us of a humorous story of a gentleman who, upon a neighbouring farmer's complaining to him, that his pigeons were a great nuisance to his land, and did sad mischief to his corn, replied jokingly, Pound them, if you catch them trespassing. The farmer, improving the hint, steeped a parcel of peas in an infusion of *coccus indicus*, or some other intoxicating drug, and strewed them upon his grounds. The pigeons swallowed them, and soon remained motionless on the field: upon which the farmer threw a net over them, inclosed them in it, and carried them to an empty barn, from whence he sent the gentleman word that he had followed his directions with regard to the pounding of his pigeons, and desired him to come and release them.

Carrier-PIGEON. See *CARRIER-Pigeon* and *COLUMBA*.

Pigeon.

PIGEON (Peter Charles Francis), curate of *St Peter du Regard*, in the diocese of Bayeux, was one of the priests lately belonging to the king's house at Winchester. He was born in Lower Normandy, of honest and virtuous parents, and of a decent fortune. His inclinations early led him to embrace the ecclesiastical state, from which neither the solicitations of his friends, nor the prospect of a more ample fortune on the death of his elder brother, could withdraw him. Several of his schoolfellows and masters, who are now resident in the king's house at Winchester, bear the most ample testimony to his assiduity, regularity, piety, and the sweetness of his disposition, during the whole course of his education. The sweetness of temper, in particular, was so remarkable, and so clearly depicted on his countenance, as to have gained him the esteem and affection of such of the inhabitants of Winchester as by any means had become acquainted with him. He was seven years employed in quality of vicar, or, as we should call it, *curate*, of a large parish in the diocese of Sees, where his virtues and talents had ample scope for exertion. His practice was to rise at five o'clock every morning, and to spend the whole time till noon (the usual time of dining for persons in his station) in prayer and study. The rest of the day, till evening, he devoted to visiting the sick, and other exterior duties of his function. In 1789, the year of the French Revolution, M. Pigeon was promoted to a curacy, or rather a rectory, in the diocese of Bayeux, called the *parish of St Peter du Regard*, near the town of Condé sur Noireau. It was easy for him to gain the good-will and the protection of his parishioners; but a Jacobin club in the above-mentioned town seemed to have no other subject to deliberate upon than the various ways of harassing and persecuting M. Pigeon and certain other priests in the neighbourhood, who had from motives of conscience refused the famous civic oath. It would be tedious to relate the many cruelties which were at different times exercised upon him, and the imminent danger of losing his life to which he was exposed, by the blows that were inflicted on him, by his being thrown into water, and being obliged to wander in woods and other solitary places, without any food or place to lay his head, in order to avoid his persecutors. We may form some judgment of the spirit of his persecutors from the following circumstance. Being disappointed on a particular occasion in the search they were making after M. Pigeon, with the view of amusing themselves with his sufferings, they made themselves amends by seizing his mother, a respectable lady of 74 years of age, and his two sisters, whom they placed upon asses with their faces turned backwards, obliging them in derision to hold the tails of these animals. Thus they were conducted in pain and ignominy throughout the whole town of Condé, for no other alleged crime except being the nearest relations of M. Pigeon. At length the decree for transporting all the ecclesiastics arrived; and this gentleman, with several others, after having been stripped of all their money, was shipped from Port Beffin, and landed at Portsmouth, where he was shortly after received into the establishment at Foxton, and, upon that being dissolved in order to make room for prisoners of war, into the king's house at Winchester. Being of a studious turn, he was accustomed, as many of his brethren also

were, to betake himself to the neighbouring lanes and thickets for the sake of greater solitude. With this view having about ten o'clock in the morning, Aug. 28. 1793, retired to a certain little valley, on the north-east side of a place called *Oram's Arbour*, the same place where the county elections for Hampshire are held, he was there found, between three and four o'clock in the afternoon, murdered, with the upper part of his skull absolutely broken from the lower part, and a large hedge-lake, covered with blood, lying by him, as were the papers on which he had been transcribing a manuscript sermon, with the hearing of which he had been much edified, and the sermon itself which he was copying, together with his pen, imbrued in blood. His watch was carried away, though part of the chain, which had by some means been broken, was left behind. He was writing the word *paradise*, the last letters of which remained unwritten when the fatal blow was given him, which appears evidently to have been discharged upon him from a gap in a hedge which was immediately behind him. At first the suspicion of this cruel murder fell upon the French democrats, who, to the number of 200, are prisoners of war, at the neighbouring town of Alresford, as one of that number, who had broken his parole, had, about three weeks before, been taken up in Winchester, and both there and at Alresford had repeatedly threatened to murder his uncle, a priest, whom he understood to be then at Winchester, not without fervent wishes of having it in his power to murder the whole establishment, consisting of more than 600 persons. However, as no French prisoner was seen that day in the neighbourhood of Winchester, as none of them were known to have left Alresford, it is evidently reasonable to acquiesce in the verdict of the coroner; namely, that the murder was committed by a person or persons unknown. The most noble marquis of Buckingham, whose munificence and kindness to those conscientious exiles, the emigrant French clergy, can only be conceived by those who have been witnesses of the same, with the truly respectable corps of the Buckinghamshire militia, then quartered at Winchester, joined in paying the last mark of respect to the unfortunate deceased, by attending his funeral, which was performed at the Roman Catholic burying-ground, called *St James's*, near the said city, on Saturday, August 29. He was just 38 years of age when he was murdered.

PIGMENTS, preparations used by painters, dyers, &c. to impart colours to bodies, or to imitate particular colours. See *COLOUR-Making*, and *DYEING*.

PIGNEROL is a town of Italy in the province of Piedmont, in E. Long. 7. 15. Lat. 44. 45. situated on the river Chizon, 10 miles south-west of Turin, at the foot of the Alps, and the confines of Dauphiny. The town is small, but populous, and extremely well fortified by the king of Sardinia, since the treaty of Utrecht. It is defended by a citadel, on the top of the mountain, near which is the castle of Perouse, which was built at the entrance of the valley of that name.

PIGNUT, or *Earthnut*. See *BUNION*.

PIGUS, in ichthyology, is the name of a species of leather mouthed fish, very much resembling the nature of the common carp; being of the same shape and size, and its eyes, fins, and fleshy palate, exactly the same; from the gills to the tail there is a crooked dotted line; the

Pigeon
||
Piguer.

PI-HAHIROTH the back and sides are bluish, and the belly reddish.

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Pike.

It is covered with large scales; from the middle of each of which there rises a fine, pellucid, prickle, which is very sharp. It is an excellent fish for the table, being perhaps preferable to the carp: and it is in season in the months of March and April. It is caught in lakes in some parts of Italy, and is mentioned by Pliny, tho' without a name. Artedi says it is a species of *cyprinus*, and he calls it the *cyprinus*, called *picus* and *pignus*.

PI-HAHIROTH, (Moses); understood to be a mouth or narrow pass between two mountains, called *Chiroth*, or *Eiroth*, and lying not far from the bottom of the western coast of the Arabian gulf; before which mouth the children of Israel encamped, just before their entering the Red Sea, (Wells).

PISSKER, in ichthyology, is a fish of the *mustela* kind, commonly called the *fosfile mustela*, or *fosfile fish*. They are generally found as long as an ordinary man's hand is broad, and as thick as one's finger; but they sometimes grow much longer: the back is of grey with a number of spots and transverse streaks, partly black and partly blue; the belly is yellow, and spotted with red, white, and black; the white are the larger, the others look as if they were made with the point of a needle; and there is on each of the sides a longitudinal black and white line. There are some fleshy excrescences at the mouth, which are expanded in swimming; and when out of the water, they are contracted. These fishes run into caverns of the earth, in the sides of rivers, in marshy places, and penetrate a great way, and are often dug up at a distance from waters. Often, when the waters of brooks and rivers swell beyond their banks, and again cover them, they make their way out of the earth into the water; and when it deserts them, they are often left in vast numbers upon the ground, and become a prey to swine. It is thought to be much of the same kind with the *fisgum* fish; and it is indeed possible that the *pæcilia* of Schouefeldt is the same.

PIKE, in ichthyology. See *Esox*.

The pike never swims in shoals as most other fish do, but always lies alone; and is so bold and ravenous, that he will seize upon almost any thing less than himself. Of the ravenous nature of this fish we shall give the following instances. At Rycott in Oxfordshire, in the year 1749, in a moat surrounding the earl of Ailingdon's seat, there was a jack or pike of such a monstrous size, that it had destroyed young swans feathers and all. An old cobb swan having hatched five young, one after another was lost till four were gone. At length an under gardener saw the fish seize the fifth. The old one fought him with her beak, and with the assistance of the gardener, released it although he had got it under water. In the year 1765 a large pike was caught in the river Ouze, which weighed upwards of 28 pounds, and was sold for a guinea. On gutting the fish, a watch with a black ribbon and two steel seals were found in its stomach, which, by the maker's name, &c. was found to belong to a person who had been drowned about six weeks before. This fish breeds but once in a year, which is in March. It is found in almost all fresh waters; but is very different in goodness, according to the nature of the places where it lives. The finest pike are those which feed in clear rivers; those in ponds and meres are inferior to

these, and the word of all are those of the fen ditches. They are very plentiful in these last places, where the water is foul and coloured; and their food, such as frogs and the like, very plentiful, but very coarse; so that they grow large, but are yellowish and high belled, and differ greatly from those which live in the clearer waters.

The fishermen have two principal ways of catching the pike; by the ledger, and by the walking-bait.

The ledger-bait is fixed in one certain place, and may continue while the angler is absent. This must be a live bait, a fish or frog; and among fish, the dace, roach, and gudgeon, are the best; of frogs, the only caution is to choose the largest and yellowest that can be met with. If the bait be a fish, the hook is to be stuck through the upper lip, and the line must be 14 yards at least in length; the other end of this is to be tied to a bough of a tree, or to a stick driven into the ground near the pike's haunt, and all the line wound round a forked stick, except about half a yard. The bait will by this means keep playing so much under water, and the pike will soon lay hold of it.

If the bait be a frog, then the arming wire of the hook should be put in at the mouth, and out at the side; and with a needle and some strong silk, the hinder-leg of one side is to be fastened by one stitch to the wire-arming of the hook. The pike will soon seize this, and must have line enough to give him leave to get to his haunt and poach the bait.

The trolling for pike is a pleasant method also of taking them: in this a dead bait serves, and none is so proper as a gudgeon.

This is to be pulled about in the water till the pike seizes it; and then it is to have line enough, and time to swallow it: the hook is small for this sport, and has a smooth piece of lead fixed at its end to sink the bait; and the line is very long, and runs through a ring at the end of the rod, which must not be too slender at top.

The art of feeding pike, so as to make them very fat, is the giving them eels; and without this it is not to be done under a very long time; otherwise perch, while small, and their prickly fins tender, are the best food for them. Bream put into a pike-pond are a very proper food: they will breed freely, and their young ones make excellent food for the pike, who will take care that they shall not increase over much. The numerous shoals of roaches and ruds, which are continually changing place, and often in floods get into the pike's quarters, are food for them for a long time.

Pike, when used to be fed by hand, will come up to the very shore, and take the food that is given them out of the fingers of the feeder. It is wonderful to see with what courage they will do this, after a while practising; and it is a very diverting sight when there are several of them nearly of the same size, to see what striving and fighting there will be for the best bits when they are thrown in. The most convenient place is near the mouth of the pond, and where there is about half a yard depth of water; for, by that means, the offal of the feedings will all lie in one place, and the deep water will serve for a place to retire into and rest in, and will be always clean and in order.

Carp will be fed in the same manner as pike; and though by nature a fish as remarkably shy and timorous

Pike,
Pila.

rons as the pike is bold and fearless, yet by custom they will come to take their food out of the person's hand; and will, like the pike, quarrel among one another for the nicest bits.

PIKE, in war, an offensive weapon, consisting of a wooden shaft, 12 or 14 feet long, with a flat steel head, pointed, called the *spear*. This weapon was long in use among the infantry; but now the bayonet, which is fixed on the muzzle of the firelock, is substituted in its stead. It is still used by some of the officers of infantry, under the name of *sponton*. The Macedonian phalanx was a battalion of pikemen. See PHALANX.

PILA MARINA, or the *sea-ball*, in natural history, is the name of a substance very common on the shores of the Mediterranean, and elsewhere. It is generally found in the form of a ball about the size of the balls of horse dung, and composed of a variety of fibrillæ irregularly complicated. Various conjectures have been given of its origin by different authors. John Bauhine tells us, that it consists of small hairy fibres and straws, such as are found about the sea plant called *alga vitriariorum*; but he does not ascertain what plant it owes its origin to. Imperatus imagined it consisted of the exuviz both of vegetable and animal bodies. Mercatus is doubtful whether it be a congeries of the fibrillæ of plants, wound up into a ball by the motion of the sea water, or whether it be not the workmanship of some sort of beetle living about the sea shore, and analogous to our common dung beetle's ball, which it elaborates from dung for the reception of its progeny. Schreckius says it is composed of the filaments of some plant of the reed kind: and Welchius supposes it is composed of the pappous part of the flowers of the reed. Maurice Hoffman thinks it the excrement of the hippopotamus; and others think it that of the phoca or sea calf. Klein, who had thoroughly and minutely examined the bodies themselves, and also what authors had conjectured concerning them, thinks that they are wholly owing to, and entirely composed of, the capillaments which the leaves, growing to the woody stalk of the *alga vitriariorum*, have when they wither and decay. These leaves, in their natural state, are as thick as a wheat straw, and they are placed so thick about the tops and extremities of the stalks, that they enfold, embrace, and lie over one another; and from the middle of these clusters of leaves, and indeed from the woody substance of the plant itself, there arise several other very long, flat, smooth, and brittle leaves. These are usually four from each tuft of the other leaves; and they have ever a common vagina, which is membranaceous and very thin. This is the style of the plant, and the *pila marina* appears to be a cluster of the fibres of the leaves of this plant, which cover the whole stalk, divided into their constituent fibres; and by the motion of the waves first broken and worn into short shreds, and afterwards wound up together into a roundish or longish ball.

PILA, was a ball made in a different manner according to the different games in which it was to be used. Playing at ball was very common amongst the Romans of the first distinction, and was looked upon as a manly exercise, which contributed both to amusement and health. The pila was of four sorts: 1st, *Follis* or *balloon*; 2^d, *Pila Trigonalis*; 3^d, *Pila Paganica*; 4th, *Harpastum*. All these come under the general

name of pila. For the manner of playing with each of them, see the articles FOLLIS, TRIGONALIS.

PILASTER, in architecture. See there, n^o 50, &c.

PILATE, or PONTIUS PILATE, was governor of Judea when our Lord was crucified. Of his family or country we know but little, though it is believed that he was of Rome, or at least of Italy. He was sent to govern Judea in the room of Gratus, in the year 26 or 27 of the vulgar era, and governed this province for ten years, from the 12th or 13th year of Tiberius to the 22^d or 23^d. He is represented both by Philo and Josephus as a man of an impetuous and obstinate temper, and as a judge who used to sell justice, and to pronounce any sentence that was desired, provided he was paid for it. The same authors make mention of his rapines, his injuries, his murders, the torments that he inflicted upon the innocent, and the persons he put to death without any form of process. Philo, in particular, describes him as a man that exercised an excessive cruelty during the whole time of his government, who disturbed the repose of Judea, and gave occasion to the troubles and revolt that followed after. St Luke (xiii. 1, 2, &c.) acquaints us, that Pilate had mingled the blood of the Galileans with their sacrifices; and that the matter having been related to Jesus Christ, he said, "Think you that these Galileans were greater sinners than other Galileans because they suffered this calamity. I tell you nay; and if you do not repent, you shall all perish in like manner. It is unknown upon what occasion Pilate caused these Galileans to be slain in the temple while they were sacrificing; for this is the meaning of that expression of mingling their blood with their sacrifices. Some think they were disciples of Judas the Gaulonite, who taught that the Jews ought not to pay tribute to foreign princes; and that Pilate had put some of them to death even in the temple; but there is no proof of this fact. Others think that these Galileans were Samaritans, whom Pilate cut to pieces in the village of Tirataba †, as they were preparing to go up to mount Gerizim, where a certain impostor had promised to discover treasures to them; but this event did not happen before the year 35 of the common era, and consequently two years after the death of Jesus Christ. At the time of our Saviour's passion, Pilate made some endeavours to deliver him out of the hands of the Jews. He knew they had delivered him up, and pursued his life with so much violence, only out of malice and envy (Matt. xxvii. 18.) His wife also, who had been disturbed the night before with frightful dreams, sent to tell him she desired him not to meddle in the affair of that just person (ib. 19.) He attempted to appease the wrath of the Jews, and to give them some satisfaction, by whipping Jesus Christ (John xix. 1. Matth. xxvii. 26.) He tried to take him out of their hands, by proposing to deliver him or Barabbas, on the day of the festival of the passover. Lastly, he had a mind to discharge himself from pronouncing judgment against him, by sending him to Herod king of Galilee (Luke xxiii. 7, 8.) When he saw all this would not satisfy the Jews, and that they even threatened him in some manner, saying he could be no friend to the emperor if he let him go (John xix. 12, 15.), he caused water to be brought, washed his hands before

Pilaster,
Pilatus.

† Joseph. Ant. lib. 18. c. 5.

Pilate.

all the people, and publicly declared himself innocent of the blood of that just person (Matt. xxvii. 23, 24.); yet at the same time he delivered him up to his soldiers, that they might crucify him. This was enough to justify Jesus Christ, as Calmet observes, and to show that he held him as innocent; but it was not enough to vindicate the conscience and integrity of a judge, whose duty it was as well to assert the cause of oppressed innocence as to punish the guilty and criminal. He ordered to be put over our Saviour's cross, as it were, an abstract of his sentence, and the motive of his condemnation (John xix. 19.), *Jesus of Nazareth, king of the Jews*, which was written in Latin, Greek, and Hebrew. Some of the Jews found fault with it, and remonstrated to Pilate that he ought to have written *Jesus of Nazareth, who pretended to be king of the Jews*. But Pilate could not be prevailed with to alter it, and gave them this peremptory answer, *That what he had written he had written*.

Towards evening, he was applied to for leave to take down the bodies from the cross, that they might not continue there the following day, which was the passover and the sabbath-day (John xix. 31.) This he allowed, and granted the body of Jesus to Joseph of Arimathea, that he might pay his last duties to it, (ib. 33.) Lastly, when the priests, who had solicited the death of our Saviour, came to desire him to set a watch about the sepulchre, for fear his disciples should steal him away by night, he answered them, that they had a guard, and might place them there themselves (Matt. xxvii. 65.) This is the substance of what the gospel tells us concerning Pilate.

Justin Martyr, Tertullian, Eusebius, and after them several others both ancient and modern, assure us, that it was formerly the custom for Roman magistrates to prepare copies of all verbal processes and judicial acts which they passed in their several provinces, and to send them to the emperor. And Pilate, in compliance to this custom, having sent word to Tiberius of what had passed relating to Jesus Christ, the emperor wrote an account of it to the senate, in a manner that gave reason to judge that he thought favourably of the religion of Jesus Christ, and showed that he should be willing they would decree divine honours to him. But the senate was not of the same opinion, and so the matter was dropped. It appears by what Justin says of these acts, that the miracles of Jesus Christ were mentioned there, and even that the soldiers had divided his garments among them. Eusebius insinuates that they spoke of his resurrection and ascension. Tertullian and Justin refer to these acts with so much confidence as would make one believe they had them in their hands. However, neither Eusebius nor St Jerome, who were both inquisitive, understanding persons, nor any other author that wrote afterwards, seem to have seen them, at least not the true and original acts; for as to what we have now in great number, they are not authentic, being neither ancient nor uniform. There are also some pretended letters of Pilate to Tiberius, giving a history of our Saviour, but they are universally allowed to be spurious.

Pilate being a man that, by his excessive cruelties and rapine, had disturbed the peace of Judea during the whole time of his government, was at length deposed by Vitellius the proconsul of Syria, in the 36th

year of Jesus Christ, and sent to Rome to give an account of his conduct to the emperor. But though Tiberius died before Pilate arrived at Rome, yet his successor Caligula banished him to Vienne in Gaul, where he was reduced to such extremity that he killed himself with his own hands. The evangelists call him governor, though in reality he was no more than procurator of Judea, not only because governor was a name of general use, but because Pilate in effect acted as one, by taking upon him to judge in criminal matters; as his predecessors had done, and other procurators in the small provinces of the empire where there was no proconsul, constantly did. See *Calmet's Dictionary*, *Echard's Ecclesiastical History*, and *Beausobre's Annot.*

With regard to Pilate's wife, the general tradition is, that she was named Claudia Procula or Procula; and in relation to her dream, some are of opinion that as she had intelligence of our Lord's apprehension, and knew by his character that he was a righteous person, her imagination, being struck with these ideas, did naturally produce the dream we read of; but others think that this dream was sent providentially upon her, for the clearer manifestation of our Lord's innocence.

PILATRE DU ROSIER (Francis), was born at Metz the 30th of March 1756. He was first apprentice to an apothecary there, and afterwards went to Paris in quest of farther improvement. He applied himself to the study of natural history and of natural philosophy, and had already acquired some reputation, when the discovery of M. de Montgolfier had just astonished the learned world. On the 25th of October 1783, he attempted an aerial voyage with the Marquis of Arlande. He performed several other excursions in this way with brilliant success, in the presence of the royal family of France, of the king of Sweden, and of Prince Henry of Prussia. He then resolved to pass into England by means of his aerial vehicle, and for that purpose he repaired to Boulogne, whence he rose about 7 o'clock in the morning of the 15th June 1785; but in half an hour after he set out, the balloon took fire, and the aeronaut, with his companion M. Romaine, were crushed to death by the fall of that machine, which was more ingenious, perhaps, than useful*. Pilatre's social virtues and courage, which were very distinguished, heightened the regret of his friends for his loss. His merit as a chemist, and his experiments as an aeronaut, procured him some pecuniary reward, and some public appointments. He had a pension from the King, was intendant of Monsieur's cabinets of natural philosophy, chemistry, and natural history, professor of natural philosophy, a member of several academies, and principal director of Monsieur's museum.

PILCHARD, in ichthyology, a fish which has a general likeness to the herring, but differs in some particulars very essential. The body of the pilchard is less compressed than that of the herring, being thicker and rounder: the nose is shorter in proportion, and turns up; the under jaw is shorter. The back is more elevated; the belly less sharp. The dorsal fin of the pilchard is placed exactly in the centre of gravity, so that when taken up by it, the body preserves an equilibrium, whereas that of the herring dips at the head. The scales of the pilchard adhere very closely, whereas those of the herring very easily drop off. The pil-

Pilate, Pilchard.

* See *Aerostation*, no 34.

Pilchard, chard is in general less than the herring; but it is fatter, or more full of oil.

The pilchard appears in vast shoals off the Cornish coasts about the middle of July, disappearing the beginning of winter, yet sometimes a few return again after Christmas. Their winter retreat is the same with that of the herring, and their motives for migrating the same †. They affect, during summer, a warmer latitude; for they are not found in any quantities on any of our coasts except those of Cornwall, that is to say, from Fowey harbour to the Scilly isles, between which places the shoals keep shifting for some weeks. The approach of the pilchard is known by much the same signs as those that indicate the arrival of the herring. Persons, called in Cornwall *buers*, are placed on the cliffs, to point to the boats stationed off the land the course of the fish. By the 1st of James I. c. 23, fishermen are empowered to go on the grounds of others to hue, without being liable to actions of trespass, which before occasioned frequent law-suits.

The emoluments that accrue to the inhabitants of that county are great, and are best expressed in the words of Dr W. Borlase, in his *Account of the Pilchard Fishery*. "It employs a great number of men on the sea, training them thereby to naval affairs; employs men, women, and children, at land, in salting, pressing, washing, and cleaning, in making boats, nets, ropes, casks, and all the trades depending on their construction and sale. The poor is fed with the offals of the captures; the land with the refuse of the fish and salt; the merchant finds the gains of commission and honest commerce; the fisherman, the gains of the fish. Ships are often freighted hither with salt, and into foreign countries with the fish, carrying off at the same time part of our tin. The usual number of hogheads of fish exported each year, for ten years, from 1747 to 1756 inclusive, from the four ports of Fowey, Falmouth, Penzance, and St Ives, in all amounts to 29,794; since it appears that Fowey has exported yearly 1732 hogheads; Falmouth, 14,631 hogheads and two thirds; Penzance and Mounts-Bay, 12,149 hogheads and one third; St Ives, 1282 hogheads. Every hoghead for ten years last past, together with the bounty allowed for each when exported, and the oil made out of each, has amounted, one year with another at an average, to the price of L. 1 : 13 : 3; so that the cash paid for pilchards exported has, at a medium, annually amounted to the sum of L. 49,532, 108." The numbers that are taken at one shooting out of the nets is amazingly great. Mr Pennant says, that Dr Borlase assured him, that on the 5th of October 1767, there were at one time inclosed in St Ives's Bay 7000 hogheads, each hoghead containing 35,000 fish, in all 245,000,000.

PILE, in heraldry, an ordinary in form of a wedge, contracting from the chief, and terminating in a point towards the bottom of the shield.

PILE, among the Greeks and Romans, was a pyramid built of wood, whereon were laid the bodies of the deceased to be burnt. It was partly in the form of an altar, and differed in height according to the quality of the person to be consumed. Probably it might originally be considered as an altar, on which the dead were consumed as a burnt-offering to the in-

fernal deities. The trees made use of in the erection of a funeral pile were such as abounded in pitch or resin, as being most combustible; if they used any other wood, it was split that it might the more easily catch fire. Round the pile were placed cypress boughs to hinder the noisome smell. See **FUNERAL**.

PILE, in building, is used for a large stake rammed into the ground in the bottom of rivers, or in marshy land, for a foundation to build upon.

Pile is also used among architects for a mass of building.

PILE, in coinage, denotes a kind of puncheon, which, in the old way of coining with the hammer, contained the arms or other figure and inscription to be struck on the coin. See **COINAGE**.

Accordingly we still call the arms-side of a piece of money the *pile*, and the head the *cross*; because in ancient coin, a cross usually took the place of the head in ours.

PILER-Engine, a very curious machine invented by Mr Vauloue for driving the piles of Westminster-bridge. It is represented Plate CCCXCIII. A is a great upright shaft or axle, on which are the great wheel B, and the drum C, turned by horses joined to the bars S, S. The wheel B turns the trundle X, on the top of whose axis is the fly O, which serves to regulate the motion, and also to act against the horses, and to keep them from falling when the heavy ram Q is discharged to drive the pile P down into the mud in the bottom of the river. The drum C is loose upon the shaft A, but is locked to the wheel B by the bolt Y. On this drum the great rope HH is wound; one end of the rope being fixed to the drum, and the other to the follower G, to which it is conveyed over the pulleys I and K. In the follower G is contained the tongs F, that takes hold of the ram Q by the staple R, for drawing it up. D is a spiral or fusy fixed to the drum, on which is wound the small rope T that goes over the pulley U, under the pulley V, and is fastened to the top of the frame at 7. To the pulley-block V is hung the counterpoise W, which hinders the follower T from accelerating as it goes down to take hold of the ram; for as the follower tends to acquire velocity in its descent, the line T winds downwards upon the fusy, on a larger and larger radius, by which means the counterpoise W acts stronger and stronger against it; and so allows it to come down with only a moderate and uniform velocity. The bolt Y locks the drum to the great wheel, being pushed upward by the small lever 2, which goes through a mortise in the shaft A, turns upon a pin in the bar 3, fixed to the great wheel B, and has a weight 4, which always tends to push up the bolt Y through the wheel into the drum. L is the great lever turning on the axis m, and resting upon the forcing bar 5, 5, which goes through a hollow in the shaft A, and bears up the little lever 2.

By the horses going round, the great rope H is wound about the drum C, and the ram Q is drawn up by the tongs F in the follower G, until the tongs come between the inclined planes E; which, by shutting the tongs at the top, opens it at the foot, and discharges the ram which falls down between the guides b b upon the pile P, and drives it by a few strokes as far into the mud as it will go; after which, the top part is sawed off close to the mud by an engine for that purpose.

Immediately

Pile.

Immediately after the ram is discharged, the piece 6 upon the follower G takes hold of the ropes *aa*, which raise the end of the lever L, and cause its end N to descend and press down the forcing bar 5 upon the little lever 2, which, by pulling down the bolt Y, unlocks the drum C from the great wheel B; and then the follower being at liberty, comes down by its own weight to the ram; and the lower ends of the tongs slip over the staple R, and the weight of their heads causes them to fall outward, and shut upon it. Then the weight 4 pushes up the bolt Y into the drum, which locks it to the great wheel, and so the ram is drawn up as before.

As the follower comes down, it causes the drum to turn backward, and unwinds the rope from it, whilst the horses, great wheel, trundle, and fly, go on with an uninterrupted motion; and as the drum is turning backward, the counterpoise W is drawn up, and its rope T wound upon the spiral fusy D.

There are several holes in the under side of the drum, and the bolt Y always takes the first one that it finds when the drum stops by the falling of the follower upon the ram; until which stoppage the bolt has not time to slip into any of the holes.

This engine was placed upon a barge on the water, and so was easily conveyed to any place desired. The ram was a ton weight; and the guides *bb*, by which it was let fall, were 30 feet high.

A new machine for driving piles has been invented lately by Mr S. Bunce of Kirby street, Hatten street, London. It will drive a greater number of piles in a given time than any other; and can be constructed more simply to work by horses than Mr Vauloué's engine above described.

Plate
CCXCIII Fig. 1 and 2 represent a side and front section of the machine. The chief parts are A, fig. 1, which are two endless ropes, or chains connected by cross pieces of iron B (see fig. 2) corresponding with two cross grooves cut diametrically opposite in the wheel C (fig. 1.), into which they are received; and by which means the rope or chain A is carried round. FHHK is a side-view of a strong wooden frame moveable on the axis H. D is a wheel, over which the chain passes and turns within at the top of the frame. It moves occasionally from F to G upon the centre H, and is kept in the position F by the weight I fixed to the end K. Fig. 3. L is the iron ram, which is connected with the cross pieces by the hook M. N is a cylindrical piece of wood suspended at the hook at O, which by sliding freely upon the bar that connects the hook to the ram, always brings the hook upright upon the chain when at the bottom of the machine, in the position of GP. See fig. 1.

When the man at S turns the usual crane-work, the ram being connected to the chain, and passing between the guides, is drawn up in a perpendicular direction; and when it is near the top of the machine, the projecting bar Q of the hook strikes against a cross piece of wood at R (fig. 1.); and consequently discharges the ram, whilst the weight I of the moveable frame instantly draws the upper wheel into the position shown at F, and keeps the chain free of the ram in its descent. The hook, while descending, is prevented from catching

the chain by the wooden piece N. For that piece being specifically lighter than the iron weight below, and moving with a less degree of velocity cannot come in contact with the iron till it is at the bottom and the ram stops. It then falls and again connects the hook with the chain, which draws up the ram, as before.

Mr Bunce has made a model of this machine, which performs perfectly well; and he observes, that, as the motion of the wheel C is uninterrupted, there appears to be the least possible time lost in the operation.

Pile-Worms, are a kind of worms found in the piles of the sea-dikes in Holland. They are of very various sizes; for some of the young ones are not above an inch or two in length, while others have been found thirteen or fourteen inches long. The heads of these creatures are covered with two hard shells or hemispheres; which together form a figure resembling an auger; and with which they bore the wood. The best remedy against them is, to perforate the pile with many small holes about an inch asunder; then it must be done over with a varnish in the hottest sun; and, while the varnish is hot, brick-dust must be strewed over it: and this being several times repeated, the pile will be covered with a strong crust absolutely impenetrable to all insects.

PILES, in medicine, the same with hæmorrhoids. See MEDICINE, n° 240, &c.

PILEUS, in Roman antiquity, was the ordinary cap or hat worn at public shows and sacrifices, and by the freedmen. It was one of the common rewards assigned to such gladiators as were slaves, in token of their obtaining freedom.

PILEWORT (*Ranunculus ficaria*, Lin.), the root. This is a very small plant, found in moist meadows and by hedge sides. The roots consist of slender fibres with some little tubercles among them, which are supposed to resemble the hæmorrhoids. From thence it has been concluded, that this root must needs be of wonderful efficacy for the cure of that distemper: to the taste, it is little other than mucilaginous; and although still retained in several of the foreign pharmacopæias, it is hardly in use in this country.

PILGRIM, one who travels through foreign countries to visit holy places, and to pay his devotion to the relics of dead saints. See PILGRIMAGE.

The word is formed from the Flemish *pelgrim*, or Italian *pelegrino*, which signifies the same; and those originally from the Latin *peregrinus*, a "stranger or traveller."

PILGRIMAGE, a kind of religious discipline, which consists in taking a journey to some holy place in order to adore the relics of some deceased saint. Pilgrimages began to be made about the middle ages of the church; but they were most in vogue after the end of the 11th century, when every one was for visiting places of devotion, not excepting kings and princes themselves; and even bishops made no difficulty of being absent from their churches on the same account. The places most visited were Jerusalem, Rome, Compostella (A), and Tours; but the greatest numbers now resort to Loretto, in order to visit the chamber of the

5 B 2

Bieled

(A) It deserves to be remarked here, that in the year 1428, under the reign of Henry VI. abundance of

Pilgrimage.

blest virgin, in which she was born, and brought up her son Jesus till he was 12 years of age. For the pilgrimage of the followers of Mahomet, see MAHOMETANISM, p. 465.

In every country where popery was established, pilgrimages were common; and in those countries which are still popish, they continue. In England, the shrine of St Thomas a Becket was the chief resort of the pious; and in Scotland, St Andrew's; where, as tradition informs us, was deposited a leg of the holy apostle. In Ireland they still continue; for, from the beginning of May till the middle of August every year, crowds of popish penitents from all parts of that country resort to an island near the centre of *Lough-fin*, or *White Lake*, in the county of *Donnegal*, to the amount of 3000 or 4000. These are mostly of the poorer sort, and many of them are proxies for those who are richer; some of which, however, together with some of the priests and bishops on occasion, make their appearance there. When the pilgrim comes within sight of the holy lake, he must uncover his hands and feet, and thus walk to the water-side, and is taken to the island for sixpence. Here there are two chapels and 15 other houses; to which are added confessionals, so contrived, that the priest cannot see the person confessing. The penance varies according to the circumstances of the penitent; during the continuance of which (which is sometimes three, six, or nine days) he subsists on oatmeal, sometimes made into bread. He traverses sharp stones on his bare knees or feet, and goes through a variety of other forms, paying sixpence at every different confession. When all is over, the priest bores a gimble-hole through the pilgrim's staff near the top, in which he fastens a cross peg; gives him as many holy pebbles out of the lake as he cares to carry away, for amulets to be presented to his friends, and so dismisses him, an object of veneration to all other papists not thus initiated; who no sooner see the pilgrim's cross in his hands, than they kneel down to get his blessing.

There are, however, other parts of Ireland sacred to extraordinary worship and pilgrimage; and the number of holy wells, and miraculous cures, &c. produced by them, is very great. That such things should exist in this enlightened age, and in a Protestant country, is indeed strange; but our wonder ceases, when we reflect that it is among the lowest, and perhaps the worst of the people. They who carry external religion to an extreme, and place that confidence in ceremony which belongs only to the spirit of it, are seldom distinguished either for their wisdom or their virtue. We do not deny, however, that they who carry matters to the other extreme, may be equally destitute of real knowledge and genuine morality.

Dr Johnson, in his *Rasselas*, gives us some observations on pilgrimage, which are so much to the purpose,

that we think we cannot do better than lay them before our readers. "Pilgrimage (said Imlac, into whose mouth the observations are put), like many other acts of piety, may be reasonable or superstitious according to the principles upon which it is performed. Long journeys in search of truth are not commanded. Truth, such as is necessary to the regulation of life, is always found where it is honestly sought: change of place is no natural cause of the increase of piety, for it inevitably produces dissipation of mind. Yet since men go every day to view the fields where great actions have been performed, and return with stronger impressions of the event, curiosity of the same kind may naturally dispose us to view that country whence our religion had its beginning: and I believe no man surveys those awful scenes without some confirmation of holy resolutions. That the Supreme Being may be more easily propitiated in one place than in another, is the dream of idle superstition; but that some places may operate upon our own minds in an uncommon manner, is an opinion which hourly experience will justify. He who supposes that his vices may be more successfully combated in Palestine, will, perhaps, find himself mistaken; yet he may go thither without folly: he who thinks they will be more freely pardoned, dishonours at once his reason and religion."

PILKINGTON (Lætitia), a famous poetical genius, the daughter of Dr Van Lewin, a physician of Dublin, where she was born in 1712. She was married very young to the Rev. Matthew Pilkington, a poet also of no inconsiderable merit; and these two wits, as is often the case, lived very unhappily together. They were at length totally separated, on the husband accidentally discovering a gentleman in her bedchamber at two o'clock in the morning; a circumstance which she accounted for in a very unsatisfactory manner. The story is told at large in her Memoirs; where she says, "Lovers of learning, I am sure, will pardon me, as I solemnly declare it was the attractive charms of a new book, which the gentleman would not lend me, but consented to stay till I read it through, that was the sole motive of my detaining him." As there are not wanting some who form objections to marrying learned wives, the chance of such literary assignations may perhaps be added to the list of them. After this unlucky adventure, Mrs Pilkington came to London; and having recourse to her pen for subsistence, through the means of Colley Cibber, she lived some time on the contributions of the great. She was however thrown into the Marshalsea for debt; and being set at liberty, opened a pamphlet shop. She raised at length a handsome subscription for her Memoirs; which are written with great sprightliness and wit, containing several entertaining anecdotes of dean Swift with whom she was intimate, as well as many pretty little

Pilgrimage, Pilkington.

ences were granted from the crown of England to captains of English ships, for carrying numbers of devout persons to the shrine of St James of Compostella in Spain; provided, however, that those pilgrims should first take an oath not to take any thing prejudicial to England, nor to reveal any of its secrets, nor to carry out with them any more gold or silver than what would be sufficient for their reasonable expences. In this year there went out thither from England, on the said pilgrimage, the following number of persons. From London 280, Bristol 200, Weymouth 122, Dartmouth 90, Yarmouth 60, Jersey 60, Plymouth 40, Exeter 30, Poole 24, Ipswich 20, in all 926 persons.

little pieces of her poetry. This ingenious but unhappy woman is said at last to have killed herself with drinking at Dublin, in 1750.

PILL, in pharmacy, a form of medicine resembling a little ball, to be swallowed whole; invented for such as cannot take bitter and ill-tasted medicinal draughts; as also to keep in readiness for occasional use without decaying. See PHARMACY-Index.

PILLAR, in architecture. See ARCHITECTURE.

PILLAR, in the manege, is the centre of the ring, or manege-ground, round which a horse turns, whether there be a pillar in it or not. Besides this, there are pillars on the circumference or sides of the manege-ground, placed at certain distances, by two and two, from whence they are called the *two pillars*, to distinguish them from that of the centre. The use of the pillar in the centre is for regulating the extent of ground, that the manege upon the volts may be performed with method and justness, and that they may work in a square, by rule and measure, upon the four lines of the volts; and also to break unruly high-mettled horses, without endangering the rider. The two pillars are placed at the distance of two or three paces one from the other; and the horse is put between those, to teach him to rise before and jerk out behind, and put himself upon raised airs, &c. either by the aids or chastisements.

Pompey's PILLAR. See ALEXANDRIA, p. 393.

PILLARS, in antiquarian topography, are large single stones set up perpendicularly. Those of them which are found in this country have been the work of the Druids; but as they are the most simple of all monuments, they are unquestionably more ancient than druidism itself. They were placed as memorials recording different events; such as remarkable instances of God's mercies, contracts, singular victories, boundaries, and sometimes sepulchres. Various instances of these monuments erected by the patriarchs occur in the Old Testament: such was that raised by Jacob at Lug, afterwards by him named *Bethel*; such also was the pillar placed by him over the grave of Rachel. They were likewise marks of execrations and magical talismans.

These stones, from having long been considered as objects of veneration, at length were by the ignorant and superstitious idolatrously worshipped; wherefore, after the introduction of Christianity, some had crosses cut on them, which was considered as snatching them from the service of the devil. Vulgar superstition of a later date has led the common people to consider them as persons transformed into stone for the punishment of some crime, generally that of sabbath-breaking; but this tale is not confined to single stones, but is told also of whole circles: witness the monuments called the *hurlers* in Cornwall, and *Rollrick stones* in Warwickshire. The first are by the vulgar supposed to have been once men, and thus transformed as a punishment for playing on the Lord's day at a game called *hurling*; the latter, a pagan king and his army.

At Wilton, where the earl of Pembroke has a very magnificent house, there is a pillar of one piece of white Egyptian granite, which was brought from the temple of Venus Genetrix at Rome, near 14 feet high and 22 inches diameter, with an inscription to Astarte or Venus.

PILLORY (*collistrigium*, "collum stringens;" *pilloria*, from the French *pilleur*, i. e. *depeculator*, or *peleri*; derived from the Greek *πύλην*, *janua*, a "door," because one standing on the pillory puts his head as it were through a door, and *οὐρα*, *video*), is an engine made of wood to punish offenders, by exposing them to public view, and rendering them infamous. There is a *statute of the pillory*, 51 Hen. III. And by statute it is appointed for bakers, forestallers, and those who use false weights, perjury, forgery, &c. 3 *Infl.* 219. Lords of leets are to have a pillory and tumbrel, or it will be the cause of forfeiture of the leet; and a village may be bound by prescription to provide a pillory, &c. 2 *Hawk.* P. C. 73.

PILOT, the officer who superintends the navigation, either upon the sea-coast or on the main ocean. It is, however, more particularly applied by our mariners to the person charged with the direction of a ship's course on or near the sea-coast, and into the roads, bays, rivers, havens, &c. within his respective district.

Pilots of ships, taking upon them to conduct any ship from Dover, &c. to any place up the river Thames, are to be first examined and approved by the master and wardens of the society of Trinity House, &c. or shall forfeit 10 l. for the first offence, 20 l. for the second, and 40 l. for every other offence; one moiety to the informer, the other to the master and wardens; but any master or mate of a ship may pilot his own vessel up the river: and if any ship be lost through the negligence of any pilot, he shall be for ever after disabled to act as a pilot. 3 Geo. I. c. 13. Also the lord-warden of the cinque ports may make rules for the government of pilots, and order a sufficient number to ply at sea to conduct ships up to the Thames: 7 Geo. I. c. 21. No person shall act as a pilot on the Thames, &c. (except in collier ships) without a licence from the master and wardens of Trinity House at Deptford, on pain of forfeiting 20 l. And pilots are to be subject to the government of that corporation; and pay ancient dues, not exceeding 1 s. in the pound, out of wages, for the use of the poor thereof. Stat. 5 Geo. II. c. 20.

By the former laws of France, no person could be received as pilot till he had made several voyages and passed a strict examination; and after that, on his return in long voyages, he was obliged to lodge a copy of his journal in the admiralty; and if a pilot occasioned the loss of a ship, he had to pay 100 livres fine, and to be for ever deprived of the exercise of pilotage; and if he did it designedly, be punished with death. *Lex Mercat.* 70. 71.

The laws of Oleron ordain, That if any pilot designedly misguide a ship, that it may be cast away, he shall be put to a rigorous death, and hung in chains: and if the lord of a place, where a ship be thus lost, abet such villains in order to have a share of the wreck, he shall be apprehended, and all his goods forfeited for the satisfaction of the persons suffering; and his person shall be fastened to a stake in the midst of his own mansion, which, being fired on the four corners, shall be burned to the ground, and he with it. *Leg. Ol.* c. 25. And if the fault of a pilot be so notorious, that the ship's crew see an apparent wreck, they may lead him to the hatches, and strike off his head; but the common law denies this hasty execution: an ignorant pilot

Pilot.

Pilot,

Piltén.

pilot is sentenced to pass thrice under the ship's keel by the laws of Denmark. *Lex Mercat.* 70.

The regulations with regard to pilots in the royal navy are as follow: "The commanders of the king's ships, in order to give all reasonable encouragement to so useful a body of men as pilots, and to remove all their objections to his Majesty's service, are strictly charged to treat them with good usage, and an equal respect with warrant-officers.

"The purser of the ship is always to have a set of bedding provided on board for the pilots; and the captain is to order the boatswain to supply them with hammocks, and a convenient place to lie in, near their duty, and apart from the common men; which bedding and hammocks are to be returned when the pilots leave the ship.

"A pilot, when conducting one of his Majesty's ships in pilot water, shall have the sole charge and command of the ship, and may give orders for steering, setting, trimming, or furling the sails; tacking the ship; or whatever concerns the navigation: and the captain is to take care that all the officers and crew obey his orders. But the captain is diligently to observe the conduct of the pilot; and if he judges him to behave so ill as to bring the ship into danger, he may remove him from the command and charge of the ship, and take such methods for her preservation as shall be judged necessary; remarking upon the log book, the exact hour and time when the pilot was removed from his office, and the reasons assigned for it.

"Captains of the king's ships, employing pilots in foreign parts of his majesty's dominions, shall, after performance of the service, give a certificate thereof to the pilot, which being produced to the proper naval officer, he shall cause the same to be immediately paid; but if there be no naval-officer there, the captain of his majesty's ship shall pay him, and send the proper vouchers, with his bill, to the navy-board, in order to be paid as bills of exchange.

"Captains of his Majesty's ships, employing foreign pilots to carry the ships they command into or out of foreign ports, shall pay them the rates due by the establishment or custom of the country, before they discharge them; whose receipts being duly vouched, and sent, with a certificate of the service performed, to the navy-board, they shall cause them to be paid with the same exactness as they do bills of exchange." *Regulations and Instructions of the Sea-service, &c.*

Plate
CCCXCII.

PILOT-Fish, or Gasterosteus Dufior, in ichthyology, is a species of the gasterosteus, and is found in the Mediterranean and in the Atlantic ocean, chiefly towards the equator. Catesby, who gives a figure of it in its natural size, together with a short description, calls it *perca marina sceleria*, or rudder-fish. One of them, which Gronovius describes, was about four inches in length, and its greatest breadth little more than an inch: the head is about a third of the body, and covered, excepting the space between the snout and the eye, with scales scarcely perceptible, and covering one another like tiles; the iris of the eye is a silver grey; the jaws are of equal size, and furnished as well as the palate with small teeth disposed in groups; there is also a longitudinal row of teeth on the tongue. The trunk of the pilot-fish is oblong, a little rounded, but it appears quadrangular towards the tail, because at

this place the lines are thicker, and form a kind of membranaceous projection. The back fin is long, and furnished with seven radii; on the fore-part of this fin are three moveable prickles very short; the fins on the breast have each of them 20 radii, forked at their extremity; the abdominal fins have six; that of the anus has 17 branches, of which the first is longest; this fin is preceded by a small moveable prickle; that of the tail is thick, large, and forked. The pilot-fish is of a brownish colour, changing into gold; a transversal black belt crosses the head; a second passes over the body at the place of the breast; a third near the moveable prickles of the back; three others near the region of the anus; and a seventh at the tail.

Seafaring people observe, that this fish frequently accompanies their vessels; and as they see it generally towards the fore part of the ship, they imagined that it was guiding and tracing out the course of the vessel, and hence it received the name of *pilot-fish*.

Osbec tells us, that they are shaped like those mackerels which have a transversal line across the body. "Sailors (continues he) give them the name of *pilots*, because they closely follow the dog-fish, swimming in great shoals round it on all sides. It is thought that they point out some prey to the dog-fish; and indeed that fish is very unwieldy. They are not only not touched, but also preserved by it against all their enemies. Psalm cvi. ver. 2. 'Who can utter the mighty acts of the Lord? Who can show forth all his praise?' This scarce and remarkable fish I had an opportunity of describing: it is *Scomber caruleo-albus cingulis transversis nigris sex, dorso monopterygion*. See the *Memoirs of the Swedish Academy of Sciences for the year 1755*, vol. xvi. p. 71. of the Swedish edition."

It likewise follows the shark, apparently for the purpose of devouring the remains of its prey. It is pretended that it acts as its pilot. The manner in which it attends the shark, according to M. Daubenton, may have given rise to this name. It is said to swim at the height of a foot and a half from the snout of this voracious animal, to follow and imitate all its movements, and to seize with address every part of its prey which the shark allows to escape, and which is light enough to buoy up towards the surface of the water. When the shark, which has its mouth below, turns to seize any fish, the pilot-fish starts away; but as soon as the shark recovers his ordinary situation, it returns to its former place. Barhut informs us, that these fishes propagate their species like the shark. He adds, that in the gulph of Guinea those fishes follow ships for the sake of the offals and human excrements; and hence the Dutch give them the name of *dung-fish*. It is remarkable, that though so small they can keep pace with ships in their swiftest course.

PILTEN, a division of Courland, which lies in Courland properly so called, derives its name from the ancient castle or palace of Piltén, built by Valdemar II. king of Denmark about the year 1220, when he founded a bishop's see in this country for the more effectual conversion of its Pagan inhabitants. This district afterwards successively belonged to the Germans, then again to the king of Denmark, the duke of Courland, and to Poland; and by virtue of the instrument of regency drawn up for this district in the year 1717, the government is lodged in seven Polish senators or coun.

Pilum,
Pimento.

counsellors, from whom an appeal lies to the king. The bishop of Samogitia also styles himself bishop of Pilten.

The most remarkable part of this district is the promontory of Domesness, which projects northward into the gulf of Livonia. From this cape a sand-bank runs four German miles farther into the sea, half of which lies under water, and cannot be discerned. To the east of this promontory is an unfathomable abyss, which is never observed to be agitated. For the safety of vessels bound to Livonia, two square beacons have been erected on the coast, near Domesness church, opposite to the sand bank, and facing each other. One of these is twelve fathoms high, and the other eight; and a large fire is kept burning on them from the first of August to the first of January. When the mariners see these fires appear as one in a direct line, they may conclude that they are clear of the extremity of the sand bank, and consequently out of danger; but if they see both beacons, they are in danger of running upon it. The district of Pilten contains seven parishes, but no towns worthy of notice. The inhabitants are chiefly of the Lutheran persuasion.

PILUM, a missile weapon used by the Roman soldiers, and in a charge darted upon the enemy. Its point, we are told by Polybius, was so long and small, that after the first discharge it was generally so bent as to be rendered useless. The legionary soldiers made use of the pilum, and each man carried two. The pilum underwent many alterations and improvements, inasmuch that it is impossible with any precision to describe it. Julius Scaliger laboured much to give an accurate account of it, and would have esteemed success on this head amongst the greatest blessings of his life. This weapon appears, however, to have been sometimes round, but most commonly square, to have been two cubits long in the shaft, and to have had an iron point of the same length hooked and jagged at the end. Marius made a material improvement in it; for during the Cimbric war, he so contrived it, that when it stuck in the enemies' shield it should bend down in an angle in the part where the wood was connected with the iron, and thus become useless to the person who received it.

PIMENTO, or, as Mr Edward writes, **PIEMENTO**, in botany, or **JAMAICA PEPPER**, or *Allspice*, a species of the myrtus. See **MYRTUS**.

"The pimento trees grow spontaneously, and in great abundance, in many parts of Jamaica, but more particularly on hilly situations near the sea, on the northern side of that island; where they form the most delicious groves that can possibly be imagined; filling the air with fragrance, and giving reality, tho' in a very distant part of the globe, to our great poet's description of those balmy gales which convey to the delighted voyager

• Sahean odours from the spicy shore

• Of Araby the blest.

• Chear'd with the grateful smell, old ocean smiles."

"This tree is purely a child of nature, and seems to mock all the labours of man in his endeavours to extend or improve its growth: not one attempt in fifty to propagate the young plants, or to raise them from the seeds, in parts of the country where it is not found

growing spontaneously, having succeeded. The usual method of forming a new pimento plantation (in Jamaica it is called a *walk*) is nothing more than to appropriate a piece of woodland, in the neighbourhood of a plantation already existing, or in a country where the scattered trees are found in a native state, the woods of which being fallen, the trees are suffered to remain on the ground till they become rotten and perish. In the course of twelve months after the first season, abundance of young pimento plants will be found growing vigorously in all parts of the land, being without doubt produced from ripe berries scattered there by the birds, while the fallen trees, &c. afford them both shelter and shade. At the end of two years it will be proper to give the land a thorough cleaning, leaving such only of the pimento trees as have a good appearance, which will then soon form such groves as those I have described, and, except perhaps for the first four or five years, require very little attention afterwards.

"Soon after the trees are in blossom, the berries become fit for gathering; the fruit not being suffered to ripen on the tree, as the pulp in that state, being moist and glutinous, is difficult to cure, and when dry becomes black and tasteless. It is impossible, however, to prevent some of the ripe berries from mixing with the rest; but if the proportion of them be great, the price of the commodity is considerably injured.

"It is gathered by the hand; one labourer on the tree, employed in gathering the small branches, will give employment to three below (who are generally women and children) in picking the berries; and an industrious picker will fill a bag of 70 lbs. in the day.

"The returns from a pimento walk in a favourable season are prodigious. A single tree has been known to yield 150 lbs. of the raw fruit, or one cwt. of the dried spice; there being commonly 2 lbs. in weight of one third in curing; but this, like many other of the minor productions, is exceedingly uncertain, and perhaps a very plenteous crop occurs but once in five years."

PIMPINELLA, **BURNET SAXIFRAGE**; a genus of the digynia order, belonging to the pentandria class of plants. There are seven species; the most remarkable of which are, 1. The major, or greater burnet saxifrage, growing naturally in chalky woods, and on the sides of the banks near hedges, in several parts of England. The lower leaves of this sort are winged; the lobes are deeply sawed on their edges, and sit close to the midrib, of a dark green. The stalks are more than a foot high, dividing into four or five branches. The lower part of the stalk is garnished with winged leaves, shaped like those at the bottom, but smaller; those upon the branches are short and trifid; the branches are terminated by small umbels of white flowers, which are composed of smaller umbels or rays. The flowers have five heart-shaped petals, which turn inward, and are succeeded by two narrow, oblong, channelled seeds. 2. The anisum, or common anise, is an annual plant, which grows naturally in Egypt; but is cultivated in Malta and Spain, from whence the seeds are annually imported into Britain. The lower leaves of this plant are divided into three lobes, which are deeply cut on their edges; the stalk rises a foot and a half high, dividing into several slender branches, garnished with

Pimento,
Pimpinella

Pimpinella

Pin.

narrow leaves, cut into three or four narrow segments, terminated by pretty large loose umbels, composed of smaller umbels or rays, which stand on pretty long footstalks. The flowers are small, and of a yellowish white; the seeds are oblong and swelling.—The former species requires no culture; the latter is too tender to be cultivated for profit in this country. However, the seeds will come up if sown in the beginning of April upon a warm border. When they come up, they should be thinned, and kept clear of weeds, which is all the culture they require.

Uses. Both these species are used in medicine. The roots of pimpinella have a grateful, warm, very pungent taste, which is entirely extracted by rectified spirit: in distillation the menstruum arises, leaving all that it had taken up from the root united into a pungent aromatic resin. This root promises, from its sensible qualities, to be a medicine of considerable utility, though little regarded in common practice: the only official composition in which it is an ingredient is the *pulvis ari compositus*. Stahl, Hoffman, and other German physicians, are extremely fond of it; and recommend it as an excellent stomachic, resolvent, detergent, diuretic, diaphoretic, and alexipharmac. They frequently gave it, and not without success, in scorbutic and cutaneous disorders, foulness of the blood and juices, tumors and obstructions of the glands, and diseases proceeding from a deficiency of the fluid secretions in general. Boerhaave directs the use of this medicine in asthmatic and hydropic cases, where the strongest resolvents are indicated: the form he prefers is a watery infusion; but the spirituous tincture possesses the virtues of the root in much greater perfection.

Aniseeds have an aromatic smell, and a pleasant warm taste, accompanied with a degree of sweetness. Water extracts very little of their flavour; rectified spirit the whole.

These seeds are in the number of the four greater hot seeds: their principal use is in cold flatulent disorders, where tenacious phlegm abounds, and in the gripes to which young children are subject. Frederic Hoffman strongly recommends them in weakness of the stomach, diarrhoeas, and for strengthening the tone of the viscera in general; and thinks they well deserve the appellation given them by Helmont, *intestinorum solamen*. The smaller kind of aniseeds brought from Spain are preferred.

PIMPLE, in medicine, a small pustule arising on the face. By mixing equal quantities of the juice of house-leek, *sedum minus*, passed through paper, and of spirit of wine rectified by itself, a white coagulum of a very volatile nature is formed, which Dr Bughart commends for curing pimples of the face; and says, that the thin liquor separated from it with sugarcandy is an excellent remedy for thick viscid phlegm in the breast.

PIN, in commerce, a little necessary instrument made of brass-wire, chiefly used by women in adjusting their dress.

In the year 1543, by statute 34 and 35 of Henry VIII. cap. vi. it was enacted, "That no person shall put to sale any pinnes but only such as shall be double-headed, and have the heads soldered fast to the shank of the pins, well-smoothed, the shank well-sha-

pen, the points well and round filed, cauted, and sharpened." From the above extract it should appear that the art of pin-making was but of late invention, probably introduced from France; and that our manufactories since that period have wonderfully improved.

Though pins are apparently simple, their manufacture is, however, not a little curious and complex. We shall therefore give our readers an account of it from Ellis's *Campagna* of London.

"When the brass-wire, of which the pins are formed, is first received at the manufactory, it is generally too thick for the purpose of being cut into pins. The first operation therefore is that of winding it off from one wheel to another with great velocity, and causing it to pass between the two, through a circle in a piece of iron of smaller diameter: the wire being thus reduced to its proper dimensions, is strained by drawing it between iron pins, fixed in a board in a zig-zag manner, but so as to leave a straight line between them: afterwards it is cut into lengths of three or four yards, and then into smaller ones, every length being sufficient to make six pins; each end of these is ground to a point, which was performed when I viewed the manufactory by boys who sat each with two small grinding stones before him, turned by a wheel. Taking up a handful, he applies the ends to the coarsest of the two stones, being careful at the same time to keep each piece moving round between his fingers, so that the points may not become flat: he then gives them a smoother and sharper point, by applying them to the other stone, and by that means a lad of 12 or 14 years of age is enabled to point about 16,000 pins in an hour. When the wire is thus pointed, a pin is taken off from each end, and this is repeated till it is cut into six pieces. The next operation is that of forming the heads, or, as they term it, *head-spinning*; which is done by means of a spinning-wheel, one piece of wire being thus with astonishing rapidity wound round another, and the interior one being drawn out, leaves a hollow tube between the circumvolutions: it is then cut with sheers; every two circumvolutions or turns of the wire forming one head; these are softened by throwing them into iron pans, and placing them in a furnace till they are red-hot. As soon as they are cold, they are distributed to children, who sit with anvils and hammers before them, which they work with their feet, by means of a lathe, and taking up one of the lengths, they thrust the blunt end into a quantity of the heads which lie before them, and catching one at the extremity, they apply them immediately to the anvil and hammer, and by a motion or two of the foot, the point and the head are fixed together in much less time than it can be described, and with a dexterity only to be acquired by practice; the spectator being in continual apprehension for the safety of their fingers ends. The pin is now finished as to its form, but still it is merely brass; it is therefore thrown into a copper, containing a solution of tin and the leys of wine. Here it remains for some time; and when taken out assumes a white though dull appearance: in order therefore to give it a polish, it is put into a tub containing a quantity of bran, which is set in motion by turning a shaft that runs through its centre, and thus by means of friction it becomes perfectly bright. The

Pinacia
Pindar.

pin being complete, nothing remains but to separate it from the bran, which is performed by a mode exactly similar to the winnowing of corn; the bran flying off and leaving the pin behind fit for immediate sale. I was the more pleased with this manufactory, as it appeared to afford employment to a number of children of both sexes, who are thus not only prevented from acquiring the habits of idleness and vice, but are on the contrary initiated in their early years in those of a beneficial and virtuous industry." See NEEDLES.

PINACIA, among the Athenians, were tablets of brass inscribed with the names of all those citizens in each tribe who were duly qualified and willing to be judges of the court of Areopagus. These tablets were cast into a vessel provided for the purpose, and the same number of beans, an hundred being white and all the rest black, were thrown into another. Then the names of the candidates and the beans were drawn out one by one, and they whose names were drawn out together with the white beans were elected judges or senators. In Solon's time there were only four tribes, each of which chose 100 senators; but the number of tribes afterwards increasing, the number of senators or judges increased to so many hundreds more.

PINANG, the Chinese name of the *Areca Catechu*, Lin. See ARICA.

PINCHBECK. See ZINC.

PINDAR, the prince of lyric poets, was born at Thebes, about 520 years B. C. He received his first musical instructions from his father, who was a flute-player by profession; after which, according to Suidas, he was placed under Myrtis, a lady of distinguished abilities in lyric poetry. It was during this period that he became acquainted with the poetess Corinna, who was likewise a student under Myrtis. Plutarch tells us, that Pindar profited from the lessons which Corinna, more advanced in her studies, gave him at this school. It is very natural to suppose, that the first poetical effusions of a genius so full of fire and imagination as that of Pindar would be wild and luxuriant; and Lucian has preserved six verses, said to have been the exordium of his first essay; in which he crowded almost all the subjects for song which ancient history and mythology then furnished. Upon communicating this attempt to Corinna, she told him smiling, that he should sow with the hand, and not empty his whole sack at once. Pindar, however, soon quitted the leading strings of these ladies, his poetical nurses, and became the disciple of Simonides, now arrived at extreme old age: after which he soon surpassed all his masters, and acquired great reputation over all Greece: but, like a true prophet, he was less honoured in his own country than elsewhere; for at Thebes he was frequently pronounced to be vanquished, in the musical and poetical contests, by candidates of inferior merit.

The custom of having these public trials of skill in all the great cities of Greece was now so prevalent,
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Pindar.

that but little fame was to be acquired by a musician or poet any other way than by entering the lists; and we find, that both Myrtis and Corinna publicly disputed the prize with him at Thebes. He obtained a victory over Myrtis, but was vanquished five different times by Corinna. The judges, upon occasions like these, have been frequently accused of partiality or ignorance, not only by the vanquished, but by posterity: and if the merit of Pindar was pronounced inferior to that of Corinna five several times, it was, says Pausanias, because the judges were more sensible to the charms of beauty than to those of music and poetry (A). Was it not strange, said the Scythian Anacharsis, that the Grecian artists were never judged by artists, their peers?

Pindar, before he quitted Thebes, had the vexation to see his Dithyrambics traduced, abused, and turned into ridicule, by the comic poets of his time; and Athenæus tells us, that he was severely censured by his brother Iyricus, for being a lipogrammatist, and composing an ode from which he had excommunicated the letter S. Whether these censures proceeded from envy or contempt cannot now be determined; but they were certainly useful to Pindar, and it was necessary that he should be lashed for such puerilities. Thebes seems to have been the purgatory of our young bard: when he quitted that city, as his judgement was matured, he avoided most of the errors for which he had been chastised, and suddenly became the wonder and delight of all Greece. Every hero, prince, and potentate, desirous of lasting fame, courted the muse of Pindar.

He seems frequently to have been present at the four great festivals, of the Olympian, Pythian, Nemean, and Isthmian games, as may be inferred from several circumstances and expressions in the odes which he composed for the victors in them all. Those at Olympia, who were ambitious of having their achievements celebrated by Pindar, applied to him for an ode, which was first sung in the Prytaneum or town-hall of Olympia, where there was a banqueting room, set apart for the entertainment of the conquerors. Here the ode was rehearsed by a chorus, accompanied by instruments. It was afterwards performed in the same manner at the triumphal entry of the victor into his own country, in processions, or at the sacrifices that were made with great pomp and solemnity on the occasion.

Pindar, in his second Isthmian ode, has apologized for the mercenary custom among poets, of receiving money for their compositions. "The world (says he) is grown interested, and thinks in general with the Spartan philosopher Aristodemus, that money only makes the man: a truth which this sage himself experienced, having with his riches lost all his friends." It is supposed that Pindar here alludes to the avarice of Simonides, who first allowed his muse to sell her favours to the highest bidder.

5 C

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(A) Pausanias says, that Corinna was one of the most beautiful women of her time, as he judged by a picture of her which he saw at Tanagris at the place where the public exercises were performed. She was represented with her head ornamented by a riband as a memorial of the victories she had obtained over Pindar at Thebes.

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There is no great poet in antiquity whose moral character has been less censured than that of Pindar. Plutarch has preserved a single verse of his *Epicidium* or *Dirge* that was sung at his funeral; which, short and simple as it is, implies great praise: *This man was pleasing to strangers, and dear to his fellow-citizens.* His works abound with precepts of the purest morality: and it does not appear that he ever traduced even his enemies; comforting himself, for their malignity, by a maxim which he inserted in his first *Pythic*, and which afterwards became proverbial, *That it is better to be envied than pitied.*

Pausanias says, that the character of poet was truly consecrated, in the person of Pindar, by the god of verse himself; who was pleased, by an express oracle, to order the inhabitants of Delphos to set apart for Pindar one half of the first fruit offerings brought by the religious to his shrine, and to allow him a conspicuous place in his temple, where in an iron chair he used to sit and sing his hymns in honour of that god. This chair was remaining in the time of Pausanias, several centuries after, and shown to him as a relic not unworthy of the sanctity and magnificence of that place.

But though Pindar's muse was pensioned at Delphos, and well paid by princes and potentates elsewhere, she seems, however, sometimes to have sung the spontaneous strains of pure friendship. Of this kind were, probably, the verses bestowed upon the musician Midas, of Agrigentum in Sicily, who had twice obtained the palm of victory by his performance on the flute at the Pythic games (n). It is in his 12th Pythic ode that Pindar celebrates the victory of Midas *over all Greece, upon that instrument which Minerva herself had invented* (c).

Fabricius tells us, that Pindar lived to the age of 90; and, according to the chronology of Dr Blair, he died 435 years B. C. aged 86. His fellow citizens erected a monument to him in the Hippodrome at Thebes, which was still subsisting in the time of Pausanias; and his renown was so great after his death, that his posterity derived very considerable honours and privileges from it. When Alexander the Great attacked the city of Thebes, he gave express orders to his soldiers to spare the house and family of Pindar. The Lacedæmonians had done the same before this period; for when they ravaged Bœotia and burned the capital, the following words were written upon the door of the poet: *Forbear to burn this house, it was the dwelling of Pindar.* Respect for the memory of this great poet continued so long, that, even in Plutarch's time, the best part of the sacred victim at the Theoxenian festival was appropriated to his descendants.

PINDARIC ode, in poetry, an ode formed in imitation of the manner of Pindar. See POETRY, n^o 136, &c.

Pindaric
||
Pineas.

PINDUS (anc. geog.), not a single mountain, but a chain of mountains, inhabited by different people of Epirus and Thessaly; separating Macedonia, Thessaly, and Epirus: An extensive chain, having Macedonia to the north, the Perrhæbi to the west, the Dolopes to the south, and the mountain itself of Thessaly (Strabo).

PINDUS, a Doric city of Ætolia, situated on the cognominal river, which falls into the Cephissus (Strabo).

PINE, in botany. See PINUS.

PINE-Apple. See BROMELIA.

PINEA, or FIGNE, in commerce, is a term used in Peru and Chili, for a kind of light, porous masses, or lumps, formed of a mixture of mercury and silver-dust from the mines. The ore, or mineral, of silver, when dug out of the veins of the mine, is first broken and then ground in mills for the purpose, driven by water with iron pestles, each of 200 pounds weight. The mineral, when thus pulverized, is next sifted, and then worked up with water into a paste; which, when half dry, is cut into pieces, called *cuerpos*, a foot long, weighing each about two thousand five hundred pounds.

Each piece or cuerpo is again kneaded up with sea-salt, which, dissolving, incorporates with it. They then add mercury, from 10 to 20 pounds for each cuerpo, kneading the paste afresh until the mercury be incorporated therewith. This office, which is exceedingly dangerous on account of the noxious qualities of the mercury, is always made the lot of the poor Indians. This amalgamation is continued for eight or nine days; and some add lime, lead, or tin ore, &c. to forward it; and, in some mines, they are obliged to use fire. To try whether or no the mixture and amalgamation be sufficient, they wash a piece in water; and if the mercury be white, it is a proof that it has had its effect; if black, it must be still farther worked. When finished, it is sent to the lavatories, which are large basons that empty successively into one another. The paste, &c. being laid in the uppermost of these, the earth is then washed from it into the rest by a rivulet turned upon it; an Indian, all the while, stirring it with his feet, and two other Indians doing the like in the other basons. When the water runs quite clear out of the basons, the mercury and silver are found at bottom incorporated. This matter they call *pella*, and of this they form the pineas, by expressing as much of the mercury as they can; first, by putting it in woollen bags, and pressing and beating it strongly; then, by stamping it in a kind of wooden mould, of an octagonal form, at bottom whereof is a brass plate pierced.

(B) This Midas is a very different personage from his long-eared majesty of Phrygia, whose decision in favour of Pan had given such offence to Apollo; as is manifest, indeed, from his having been cotemporary with Pindar.

(C) The most extraordinary part of this musician's performance that can be gathered from the scholiast upon Pindar, was his finishing the solo, without a reed or mouth-piece, which broke accidentally while he was playing. The legendary account given by the poet in this ode, of the occasion upon which the flute was invented by Minerva, is diverting: "It was (says he) to imitate the howling of the Gorgons, and the hissing of their snakes, which the goddess had heard when the head of Medusa (one of these three anti-graces) was cut off by Perseus."

Pineal
Gland,
Pineau

pierced full of little holes. The matter, when taken out of the mould, is laid on a trivet, under which is a large vessel full of water; and the whole being covered with an earthen head, a fire is made around it.

The mercury still remains in the mass and is thus reduced into fumes, and, at length condensing, it is precipitated into the water, leaving behind it a mass of silver grains of different figures, which, only joining or touching at the extremes, render the matter very porous and light. This, therefore, is the pinea, or pigne, which the workmen endeavour to sell secretly to vessels trading to the South sea; and from which those, who have ventured to engage in so dangerous a commerce, have made such vast gains. Indeed the traders herein must be very careful; for the Spanish miners are arrant knaves, and to make the pignes weigh the more, they often fill the middle with sand or iron.

PINEAL GLAND. See ANATOMY.

PINEAU (Severin du), who died at Paris in 1619, was a native of Chartres, and first surgeon to the king of France. He was very skilful in lithotomy; and has left behind him, 1. A Discourse concerning the Extraction of the Stone in the Bladder, published in 1610 in 8vo. 2. A treatise *De Virginitatis Notis*, printed at Leyden 1641, in 12mo. This last performance, however useful it may be to men of science, we would not venture to recommend to the perusal of young people, on account of some particulars which it was perhaps unnecessary to expose to the eyes of the public.

PINEAU (Gabriel du), was born at Angers in 1573, where he followed the profession of a lawyer with a reputation above his years. He went afterwards to Paris, and pled with éclat before the parliament and great council. Upon his return to Angers, he became a counsellor in the presidial court. He was consulted by all the neighbouring provinces, and had an active hand in all the great affairs of his time. Mary de Medicis conferred upon him the office of master of requests, and in her disgrace wished to support herself by his credit and counsels; but Du Pineau, always attentive to what he owed on the one hand to the mother of his king, and on the other to the king himself, never ceased to inspire that princess with sentiments of peace.

In 1632 Louis XIII. by way of reward, appointed him mayor and captain-general of the city of Angers; a situation in which he merited the flattering title of *Father of the People*. He had no respect of persons; for he was equally accessible to the poor and the great. This worthy citizen died the 15th of October 1644, at the age of 71. His house was a kind of academy, where regular conferences were held, and attended by young officers, advocates, and other literary characters. In those conferences every one freely stated the difficulties which occurred to him upon subjects either of law or history; and when Pineau spoke, all was made clear; but he was always the last in delivering his sentiments, because he perceived that too much deference was paid to his opinion. His writings are, 1. Latin notes, in addition to those of Du Moulin, upon the canon law, and printed along with the works of that eminent lawyer by the care of Francis Pinfon. 2. Commentaries, observations, and consultations, upon several important questions respecting the laws both of Aq.

jou and of France, with some dissertations upon different subjects, &c. reprinted in 1725 in 2 vol. fol. by the care of Livoniere, who has enriched them with very useful remarks. The editor says, that "Du Pineau is a little inferior to the celebrated Du Moulin on the civil law, but that he is more accurate than the other upon the canon law."—Menage made these two verses upon his death:

*Pinellus perit, Themidis pius ille sacerdos,
In proprio iudex limine perpetuus.*

PINEDA (John), who was born at Seville of a noble family, entered into the society of Jesuits in 1572. He taught philosophy and divinity in several colleges; and devoted his time to the study of the Holy Scriptures. That he might render that study the easier, he made himself master of the oriental languages. We have of his writings, 1. Two volumes of Commentaries upon the book of Job, in folio. 2. Two upon Ecclesiastes. 3. A General History of the Church, in Spanish, 4 vol. in folio. 4. A History of Ferdinand III. in the same language, in folio. He died in 1637, much regretted by the members of his society, and by the public in general.

PINELLI (John Vincent), born at Naples, was son of Count Pinelli, a noble Genoese, who had settled in that city, and had acquired a handsome fortune in the way of trade. After receiving a liberal education he quitted the place of his nativity, and repaired to Padua, where he took up his residence at the age of 24. Being a great lover of science, he gave a preference to that city on account of its famous university, which brought to it a number of learned men. He had an excellent library, which consisted of a choice collection of books and manuscripts, and which he continued to enrich till the hour of his death. His literary correspondence, not only in Italy, but through the most of Europe, procured him all the new works which were worthy of a place in his collection. The authors themselves were often forward to pay their respects to him. In many cities of Italy he had persons employed to search, at least once a month, the stalls of those artificers who make use of old parchments, such as lute-makers, sieve-wrights, and others; and by this means he had the good fortune often to save from destruction some valuable fragments. His passion for knowledge embraced all the sciences; but history, medals, antiquities, natural history, and particularly botany, were his favourite studies. He was consulted from all quarters, and the extent of his acquaintance with the learned world was very great. He corresponded with Justice Lipsius, Joseph Scaliger, Sigonius, Possevin, Peter Pithou, and a great many others, who have all paid the highest compliments to his erudition. Insensible to all the pleasures of life, and acquainted only with those of the mind, he had a great dislike to plays, entertainments, shows, and every thing which most excites the curiosity of other men. During the space of 43 years that he lived at Padua, he was never known to be out of the city but twice; once on occasion of a plague which infected it; and afterwards on a voyage to Naples, which he made at the earnest solicitation of his friends. In short, Pinelli was generous, sympathizing, and compassionate, particularly to men of letters, whose wants he often anticipated. His zeal

Pine's,
Pinelli.

Pinet
||
Pinguicula.

for the progress and advancement of science rendered him very communicative of his knowledge and of his books; but this was always done with judgment and discretion. He died in 1601, aged 68, without having published any work. Paul Gualdo, who has written Pinelli's life, does not specify the number of volumes of which his rich library consisted: he only informs us, that when it was transported by sea to Naples, it was packed up in 130 chests, of which 14 contained manuscripts; but it did not go wholly to his heirs. The senate of Venice caused their seal to be set upon the manuscripts, and took away whatever concerned the affairs of the republic, to the number of 200 pieces.—“I compare (says President de Thou) Pinelli to Titus Pomponius; for, as that illustrious Roman was called *Attick*, Pinelli also bore the title of *Venetian*, on account of the great affection which the republic of Venice had for him.

PINET (Antony du), lord of Noroy, lived in the 16th century, and was a native of Befançon. He was strongly attached to the Protestant religion, and a bitter enemy to the church of Rome. His book, intitled *La Conformité des Eglises Reformées de France*, and *de l'Eglise primitive*, printed at Lyons, 1564, in 8vo; and the notes which he added to the French translation of the Fees of the Pope's Chaucery, which was printed at Lyons, in 8vo, 1564, and reprinted at Amsterdam in 1700, in 12mo, plainly discover his sentiments. He published the last mentioned performance under this title: *Taxe des parties casuelles de la boutique du Pape*, in Latin and French, with some notes taken from decrees, councils, and canons, in order to ascertain the discipline anciently observed in the church. In the epistle dedicatory, he assumes the tone of a declared enemy to the court of Rome. He apologizes for having presented this book “to a society so holy as yours (the Protestants), in which are heard only hymns, psalms, and praises, to the Lord our God: but it is proper to show to the villain his villany, and the fool his folly, lest one should be thought to resemble them.” We see by this specimen, that Pinet had no more politeness in his style than in his manners. His translation of Pliny's Natural History, printed at Lyons, in 2 vol. folio, 1566, and at Paris, 1608, was formerly much read. Though there are a good many errors in it, it is yet very useful at present, especially for those who understand Pliny's Latin, on account of the translator's researches, and a great number of marginal notes. Pinet also published Plans of the principal fortresses in the world at Lyons, 1564, in folio.

PING-LEANG SOU, a city of China in the Province of Chen-si. It is one of the most considerable cities of the western part of the province, and is situated on the river Kin-ho. The air here is mild; and the agreeable views which the surrounding mountains present, added to the streams which water the country, render it a very delightful residence. It has under its jurisdiction three cities of the second class and seven of the third. In this district is a valley so deep and narrow, that it is almost impervious to the light: a large highway, paved with square stones, runs through it.

PINGUICULA, BUTTERWORT; a genus of the monogynia order, belonging to the diandria class of plants. There are four species; of which the most re-

markable is the vulgaris, or common butterwort, growing commonly on bogs or low moist grounds in England and Scotland. Its leaves are covered with soft, upright pellucid prickles, secreting a glutinous liquor. The flowers are pale red, purple, or deep violet colour, and hairy within. If the fresh gathered leaves of this plant are put into the strainer through which warm milk from the cow is poured, and the milk set by for a day or two to become acedent, it acquires a consistency and tenacity, and neither whey nor cream separate from it. In this state it is an extremely grateful food, and as such is used by the inhabitants of the north of Sweden. There is no further occasion to have recourse to the leaves; for half a spoonful of this prepared milk, mixed with fresh warm milk, will convert it to its own nature, and this again will change another quantity of fresh milk, and so on without end. The juice of the leaves kills lice; and the common people use it to cure the cracks or chops in cows' udders. The plant is generally supposed injurious to sheep, by occasioning in them that disease called the *rot*. But from experiments made on purpose, and conducted with accuracy, it appears, that neither sheep, cows, goats, horses, or swine, will feed upon this plant.

Wherever this plant, called also *Tork/hire sanicle*, is found, it is a certain indication of a boggy soil. From the idea that the country people have of its noxious operation on sheep, this plant has been called the *white rot*; since as they imagine it gives them the rot whenever they eat it, which they will not do but from great necessity.

The Laplanders, like the Swedes with the milk of cows, receive that of the rein-deer upon the fresh leaves of this plant, which they immediately strain off and set aside till it becomes somewhat acedent; and the whole acquires in a day or two the consistence of cream without separating the serum, and thus becomes an agreeable food. When thus prepared, a small quantity of the same has the property of rennet in producing the like change on fresh milk.

PINGUIN, or PENGUIN, in ornithology, a genus of birds of the order of palmipedes; distinguished by Mr Latham by the following characters. The bill is strong, straight, more or less bending towards the point, and furrowed on the sides; the nostrils are linear, and placed in the furrows; the tongue is covered with strong spines, pointing backwards; the wings are small, very like fins, and covered with no longer feathers than the rest of the body, and are useless in flight; the body is clothed with thick short feathers, having broad shafts, and placed as compactly as the scales of fishes; the legs are short, thick, and placed very near the vent; the toes are four, and are all placed forwards, the interior are loose, and the rest are webbed; the tail is very stiff, consisting of broad shafts scarcely webbed.

It is agreed that Pinguins are inhabitants of southern latitudes only; being, as far as is yet known, found only on the coasts of South America from Port Desire to the Straits of Magellan; and Frezier says they are found on the western shore as high as Concepcion. In Africa they seem to be unknown, except on a small isle near the Cape of Good Hope, which takes its name from them. They are found in vast numbers on land during the breeding season; for they seldom come on shore but at that time: they form burrows under

Penguin. ground like rabbits; and the isles they frequent are perfectly undermined by them.

Their attitude on land is quite erect, and on that account they have been compared by some to pygmies, by others to children with white bibs. They are very tame, and may be driven like a flock of sheep. In water they are remarkably active, and swim with vast strength, assisted by their wings, which serve instead of fins. Their food in general is fish; not but that they will eat grass like geese.

Mr Latham remarks, that this genus appears to hold the same place in the southern division of the earth that the awks do in the northern; and that, however authors may differ in opinion on this head, they ought not to be confounded with one another. The penguin is never seen but in the temperate and frigid zones south of the equator, while the awk only appears on the parallel latitudes north of the equator; for neither of these genera have yet been observed within the tropics. Forster, in his voyage (vol. i. page 92.), says, he saw one for the first time in lat. 48. south, nor are they ever met with nearer than 40 degrees south. *Id. Introd. Disc. on Penguins, Comment. Got. vol. 3d.*

The wings of the penguin are scarcely any thing else than mere fins, while the awk has real wings and gills, though they be but small. The former has four toes on each foot, the latter only three. While swimming, the penguin sinks wholly above the breast, the head and neck only appearing out of the water; while the awk, like most other birds, swims on the surface. There are several other peculiarities which serve to distinguish the two genera, but what we have mentioned are doubtless sufficient.

Latham's Synopsis. "The bodies of the penguin tribe (says our author) are commonly so well and closely covered with feathers that no wet can penetrate; and as they are in general excessively fat, these circumstances, united secure them from cold. They have often been found above 700 leagues from land; and frequently on the mountains of ice, on which they seem to ascend without difficulty, as the soles of their feet are very rough and suited to the purpose." Mr Latham enumerates nine different species of this genus, besides two varieties of the black-footed penguin or diomedea.

1. The first, which is a very beautiful species, our author calls the *crested* penguin. The birds of this species are 23 inches long; the bill is three inches long, and of a red colour, with a dark furrow running along on each side to the tip; the upper mandible is curved at the end, the under is obtuse; the irides are of a dull red; the head, neck, back, and sides are black. Over each eye there is a stripe of pale yellow feathers, which lengthens into a crest behind, nearly four inches long; the feathers on each side of the head, above this stripe, are longer than the rest, and stand upward, while those of the crest are decumbent, but can be erected on each side at pleasure; the wings, or rather fins, are black on the outside, edged with white; on the inside they are white; the breast and all the under parts are also white; the legs are orange, and the claws are dusky. The female has a streak of pale yellow over the eye, but it is not prolonged into a crest behind as in the male.

This species inhabits Falkland's Islands, and was likewise met with in Kerguelen's Land, or Isle of Deso-

lation, as well as at Van Diemen's Land, and New Holland, particularly in Adventure Bay. They are called *hopping penguins* and *jumping jacks*, from their action of leaping quite out of the water, on meeting with the least obstacle, for three or four feet at least; and indeed, without any seeming cause they often do the same, appearing chiefly to advance by that means. This species seems to have a greater air of liveliness in its countenance than others, yet is in fact a very stupid bird, so much so as to suffer itself to be knocked on the head with a stick when on land. Forster says he found them difficult to kill, and when provoked, he adds, they ran at the sailors in flocks, and pecked their legs, and spoiled their clothes. When angered too they erect their crests in a beautiful manner. These birds make their nests among those of the pelican tribe, living in tolerable harmony with them; and lay seldom more than one egg, which is white, and larger than that of a duck. They are mostly seen by themselves, seldom mixing with other penguins, and often met with in great numbers on the outer shores, where they have been bred. They are frequently so regardless as to suffer themselves to be taken by the hand. The females of this species lay their eggs in burrows, which they easily form of themselves with their bills, throwing out the dirt with their feet. In these holes the eggs are deposited on the bare earth. The general time of sitting is in October; but some of the species, especially in the colder parts, do not sit till December, or even January. How long they sit is not known.

2. The second species mentioned by Latham is the *patagonian*. It is distinguished by this name not only because it is found on that coast, but also because it exceeds in bulk the common penguins as much as the natives are said to do the common race of men. It was first discovered by Captain Macbride, who brought one of them from Falkland Islands off the Straits of Magellan. The length of the stuffed skin of this particular bird measured four feet three inches, and the bulk of the body seemed to exceed that of a swan. The bill was four inches and a half long, slender, straight, bending on the end of the upper mandible, with no nostrils. The tongue half the length of the bill, and singularly armed with strong sharp spikes pointing backwards. The plumage is most remarkable, the feathers lying over one another with the compactness of the scales of a fish; their texture equally extraordinary; the shafts broad and very thin; the vanes unwebbed; the head, throat, and hind part of the neck, are of a deep brown colour; from each side of the head to the middle of the fore part of the neck are two lines of bright yellow, broad above, narrow beneath, and uniting half way down; from thence the same colour widens towards the breast, fading away till it is lost in pure white, of which colour is the whole under side of the body, a dusky line dividing it from the colour of the upper part. The whole back is of a very deep ash-colour, almost dusky; but the end of each feather is marked with a blue spot, those about the junction of the wings larger and paler than the others. The wings are in this species, as in all the others, extremely short in respect to the size of the bird; hang down, and have the appearance of fins, whose office they perform; their length is only 14 inches; on the outside they are dusky, and covered

Plate
CCCXCVI

Penguin.

vered with scale-like feathers, or at best, with such whose shafts are so broad and flat as scarce to be distinguished from scales; those on the ridge of the wings consisting entirely of shaft; the larger, or quill feathers, have some very short webs. The tail consists of 30 brown feathers, or rather thin shafts, resembling split whale-bone; flat on the upper side, concave on the under, and the webs short, unconnected, and brittle. From the knees to the end of the claws six inches, covered with strong pentangular black scales; the fore toe scarce an inch long, and the others so remarkably short, as to evince the necessity of that strength of the tail, which seems intended as a support to the bird in its erect attitude; in the same manner as that of the woodpecker is when it clings to the sides of trees: between the toes is a strong femilunar membrane, continued up even part of the claws; the middle claw is near an inch long, and the inner edge very sharp and thin; the interior toe is small, and placed very high. The skin is extremely tough and thick; which, with the closeness of the feathers, guards it effectually in the element where it is so conversant.

This species, which was, as we have seen, first met with in Falkland Islands, has since been seen in Kerguelen's Land, New Georgia, and New Guinea. M. Bougainville caught one, which soon became so tame as to follow and know the person who had care of it: it fed on flesh, fish, and bread; but after a time grew lean, pined away, and died. The chief food, when at large, is thought to be fish; the remains of which, as well as crabs, shell-fish, and molluscs, were found in the stomach. This species is the fattest of the tribe; and therefore most so in January when they moult. They are supposed to lay and sit in October. They are met with in the most deserted places. Their flesh is black, though not very unpalatable. This has been considered as a solitary species, but has now and then been met with in considerable flocks. They are found in the same places as the papuan penguins, and not unfrequently mixed with them; but in general show a disposition of associating with their own species.

3. The third species is denominated *papuan*. It is about 2½ feet long, being a little bigger than that which is called the *Cape Penguin*. This species inhabits the Isle of Papos, or New Guinea; and has been met with at Falkland Isles and Kerguelen's Land; it is often found among the patagonian penguins.

4. The antarctic penguin is about 25 inches long, and weighs about 11½ pounds. The bill is upwards of 2½ inches long; the upper parts of the body are black, the under are glossy white; beneath the chin there is a narrow streak of a blackish colour, passing backward towards the hind head, a little bent about the region of the ears; the wings are much the same as in the other species; the tail is cuneiform; the feathers, or rather bristles, of which it is composed are black and in number 32; the legs are of a flesh colour, and the soles of the feet are black.

"This species (says Latham) inhabits the south sea, from 48 degrees to the antarctic circle; and is frequently found on the ice mountains and islands, on which it ascends; it is a pretty numerous species. Our last voyagers found them in plenty in the Isle of Desolation. And it was observed, that in an island they touched at, not greatly distant, the rocks were almost

covered with penguins and shags; the first most probably of this sort."

5. For the black-footed penguin, or diomedea demersa, see DIOMEDEA.

6. The magellanic species is about the size of the antarctic penguin. They are about 2 feet and sometimes 2½ feet long, and weigh 11 pounds. The bill is black, having a transverse band across near its tip; the head and neck are black, except a few markings here and there; the upper parts of the body and wings are of the same colour; the under parts of both are white from the breast, except a narrow band of black passing at a little distance within the white on the breast, and downwards on each side, beneath the wings quite to the thighs; the legs are of a reddish colour, irregularly spotted on the thighs; and the claws are black. This species, which is very numerous, inhabits the Straits of Magellan, Staten Land, Terra del Fuego, and Falkland islands. Far from being timid, these birds will often attack a man and peck his legs. As food they are not at all unpalatable. They often mix with sea-wolves among the rushes, burrowing in holes like a fox. They swim with prodigious swiftness. They lay their eggs in collective bodies, resorting in incredible numbers to certain spots, which their long residence has freed from grass, and to which were given the name of towns.—Penrose observes, that they composed their nests of mud, a foot in height, and placed as near one another as may be. It is possible that they may have different ways of nesting, according to the places they inhabit; or perhaps the manners of this may be blended with those of another. "Here, (says he, i. e. in the places they frequent), during the breeding season, we were presented with a sight which conveyed a most dreary, and I may say awful, idea of the desertion of these islands by the human species:—a general stillness prevailed in these towns; and whenever we took our walks among them, in order to provide ourselves with eggs, we were regarded indeed with side-long glances, but we carried no terror with us.

"The eggs are rather larger than those of a goose, and laid in pairs. When we took them once, and sometimes twice in a season, they were as often replaced by the birds; but prudence would not permit us to plunder too far, lest a future supply in the next year's brood might be prevented." They lay some time in November, driving away the albatrosses, which have hatched their young in turn before them. The eggs were thought palatable food, and were preserved good for three or four months.

7. The collared penguin is a very little less than the papuan, being 18 inches long. The bill, which is black, is similar to that of the patagonian penguin; the irides are black; the eye is surrounded with a bare skin of a blood colour, of an oval shape, and three times as large as the eye itself; the head, throat, hind part of the neck, and sides, back, wings, and tail, are all black; the fore part of the neck, breast, belly, and thighs, are white, extending round the neck, where the white begins, like a collar, except that it does not quite meet at the back part; the legs are black.

This species inhabits New Guinea. It was also seen by Dr Foster near Kerguelen's Land; and again on two isles adjoining to the island of South Georgia.

8. For

Penguin.

Pinion
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Pinna.

8. For the red-footed penguin, or phaeton demersus, see PHAETON.

9. The *small*, or, as Latham calls it, the *little penguin*, is about the size of a teal, being 15 inches long. The bill, which is of a dusky colour, is about $1\frac{1}{2}$ long, and shaped like that of the phaeton demersus; the upper parts of the bird from the head to the tail appear to be of a cinereous blue colour, of which colour are the ends of the feathers; the base of them, however, is brown black, and the shafts of each of the same colour; the under parts from chin to vent are white; the wings are dusky above and white beneath; the tail, which is exceedingly short, consists of 16 stiff feathers, which are scarcely perceptible; the legs are of a dull red colour; the webs are dusky, and the claws are black.

This species is pretty commonly found among the rocks on the southern parts of New Zealand, but they are most frequent at Dusky Bay. They make deep burrows on the sides of the hills, in which they lay their eggs: these holes are so thick in some parts, that a person is scarcely able to walk three or four steps without falling into one of them up to the knees. The inhabitants of Queen Charlotte's Sound kill them with sticks, and, after skinning them, esteem the flesh as good food. They are known at New Zealand by the name of *korora*.—"These birds (says Latham), I have found to vary both in size and colour: some are much smaller than others, quite black above, and measure only 13 inches in length; others are rather larger, and of a plain lead-colour on the upper parts, and the wings black, though all are white, or nearly so, beneath. The legs in these two last are marked with black at the ends of the toes; and the claws are black."

PINION, in mechanics, an arbor, or spindle, in the body whereof are several notches, which catch the teeth of a wheel that serves to turn it round, or it is a lesser wheel that plays in the teeth of a larger.

PINK, a name given to a ship with a very narrow stern; whence all vessels, however small, whose sterns are fashioned in this manner, are called *pink sterned*.

PINK, in botany. See DIANTHUS.

Plate
CXXCII.

PINNA, in zoology; a genus belonging to the order of vermes testacea. See MYTILUS, n° 6. The animal is a slug. The shell is bivalve, fragile, and furnished with a beard; gapes at one end; the valves hinge without a tooth. They inhabit the coasts of Provence, Italy, and the Indian ocean. The largest and most remarkable species inhabits the Mediterranean. It is blind, as are all of the genus; but furnished with very strong calcareous valves. The scuttle-fish (*Jepia*), an inhabitant of the same sea, is a deadly foe to this animal: as soon as the pinna opens its shell, he rushes upon her like a lion; and would always devour her, but for another animal whom she protects within her shell, and from whom in return she receives very important services. It is an animal of the crab kind (see CANCER, n° 15.), naked like the hermit, and very quick sighted. This cancer or crab the pinna receives into her covering: and when she opens her valves in quest of food, lets him out to look for prey. During this the scuttle fish approaches; the crab returns with the utmost speed and anxiety to his hostess, who being thus warned of the danger shuts her doors, and keeps out the enemy. That very saga-

cious observer Dr Haffelquist, in his voyage towards Palestine, beheld this curious phenomenon, which tho' well known to the ancients had escaped the moderns. Aristotle (*Hist. lib. 5. c. 15.*) relates, that the pinna kept a guard to watch for her: That there grew to the mouth of the pinna a small animal, having claws, and serving as a caterer, which was like a crab, and was called the *pinnophylax*. Pliny (*lib. 9. 51.*) says, the smallest of all the kinds is called the *pinnoteret*, and therefore liable to injury; this has the prudence to hide itself in the shells of oysters. Again, *lib. 9. 66.* he says, the pinna is of the genus of shell fish; it is produced in muddy waters, always erect, nor ever without a companion, which some call the *pinnoteret*, others the *pinnophylax*. This sometimes is a small squill, sometimes a crab, that follows the pinna for the sake of food. The pinna, upon opening its shell, exposes itself as a prey to the smallest kind of fishes; for they immediately assault her, and, growing bolder upon finding no resistance, venture in. The guard watching its time gives notice by a bite; upon which the pinna, closing its shell, shuts in, kills, and gives part of whatever happens to be there to its companion.

The pinna and the crab together dwell,
For mutual succour, in one common shell.
They both to gain a livelihood combine;
That takes the prey, when this has given the sign.
From hence this crab, above his fellows fam'd,
By ancient Greeks was *pinnoteret* nam'd.—OPPIAN.

The *pinnæ marinæ* differ less from muscles in the size of their shells than in the fineness and number of certain brown threads which attach them to the rocks, hold them in a fixed situation, secure them from the rolling of the waves, especially in tempests, and assist them in laying hold of slime. See MYTILUS, p. 611. note (a). These threads, says Rondelet, are as fine, compared with those of muscles, as the finest flax is compared with tow. M. de Reaumur says, that these threads are nearly as fine and beautiful as silk from the silk-worm, and hence he calls them the *silk-worms of the sea*. Stuffs, and several kinds of beautiful manufacture, are made of these threads at Palermo; in many places they are the chief object of fishing, and become a silk proper for many purposes. It requires a considerable number of the *pinnæ marinæ* for one pair of stockings. Nothing can equal the delicacy of this singular thread. It is so fine, that a pair of stockings made of it can be easily contained in a snuff-box of an ordinary size. In 1754, a pair of gloves or stockings of these materials was presented to Pope Benedict XIV. which, notwithstanding their extreme fineness, secured the leg both from cold and heat. A robe of the same singular materials was the gift of the Roman emperor to the Satraps of Armenia. See *Præcopius de Edif. lib. 3. c. 1.* A great many manufacturers are employed in manufacturing these threads into various stuffs at Palermo and other places.

The men who are employed in fishing up the *pinnæ marinæ*, inform us, that it is necessary to break the tuft of threads. They are fished up at Toulon, from the depth of 15, 20, and sometimes more than 30, feet, with an instrument called a *cramp*. This is a kind of fork of iron, of which the prongs are perpendicular with respect to the handle. Each of them is

Pinna
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Pint.

about eight feet in length, and there is a space between them of about six inches; the length of the handle is in proportion to the depth of the water; the pinnæ are seized, separated from the rock, and raised to the surface by means of this instrument. The tuft of silk issues directly from the body of the animal; it comes from the shell at the place where it opens, about four or five inches from the summit or point in the large pinna.

M. de Reaumur, *Mem. de l'Acad. des Sciences*, 1711, page 216. and 1717, page 177, considers the pinna as the most proper of all shell-fish to elucidate the formation of pearls. It produces many of them of different colours, as grey or lead-coloured, red, and some of a blackish colour, and in the form of a pear.

M. d'Argenville distinguishes three kinds of the pinna: 1st, The large kind, which are red within, and which have reddish mother-of-pearl, similar to the substance of the shell itself. There are of those shells which weigh near 15 pounds. This is the *astura* of the Venetians.

2^d, The smaller kind. Some of these are slender, *patyracous*, of the colour of horn, a little shaded with pale red.

3^d, The kind called *perna*. These are adorned with points in the channels of their shell; but what is very singular, the edges of the shell are thicker at the openings than at the joining of the valves.

The animal which lodges in the pinna marina rarely shows itself, because the valves are seldom opened. Its head is below, its largest extremity opposite; it is kept in the shell by four vigorous muscles, placed at the extremities of the valves; the shell has no hinges, but a flat and blackish ligament, which is equal in length to one-half of the shell. See PINNOTERUS and PEARL.

PINNACE, a small vessel navigated with oars and sails, and having generally two masts, which are rigged like those of a schooner.

PINNACE is also a boat usually rowed with eight oars. See the article BOAT.

PINNACLE, in architecture, the top or roof of an house, terminating in a point. This kind of roof among the ancients was appropriated to temples; their ordinary roofs were all flat, or made in the flat-form way.

PINNATED LEAVES, in botany. See BOTANY, p. 445. n^o 232.

PINNATIFID, do. p. 442. n^o 103.

PINNOTERUS, or PINNOPHYLAX, is a kind of crab-fish, furnished with very good eyes. It is said to be the companion of the pinna marina. They live and lodge together in the same shell, which belongs to the latter. When it has occasion to eat, it opens its valves, and sends out its faithful purveyor to procure food. If during their labour the pinnoterus perceives the polypus, it immediately returns to warn its blind friend of the danger, when, by shutting its valves, it escapes the rage of its enemy; but when the pinnoterus loads itself with booty without molestation, it makes a gentle noise at the opening of the shell, and when admitted the two friends feast on the fruits of its industry. See PINNA, &c.

PINT (*pinta*), a vessel, or measure, used in estimating the quantity of liquids, and even sometimes of

dry things.—Budeus derives the word from the Greek *πιντα*; others from the German *pint*, a little measure of wine; Nicod from the Greek *πινω*, "to drink."

The *English pint* is twofold; the one for wine-measure, the other for beer and ale-measure. See MEASURE.

PINTADA, a species of PROCELLARIA.

PINTLES, certain pints or hooks fastened upon the back part of the rudder, with their points downwards, in order to enter into, and rest upon, the *gozings*, fixed in the stern-post, to hang the rudder. See HELM.

PINTOR (Peter), born at Valentia in Spain, in the year 1420, was physician to Alexander VI. whom he followed to Rome, where he practised with great success. He has left behind him two performances of considerable merit, 1. *Aggregator Sententiarum Doctorum de Curatione in Pefilentia*, printed at Rome 1499, in folio. 2. *De Morto Fado & Occulto his Temporibus Affligenti*, &c. printed at Rome, 1500, in 4to, black letter; a book extremely scarce, unknown to Luilini and Altruc, and which traces the venereal disease to the year 1496. Pintor died at Rome in 1503, aged 83 years.

PINTURICCIO (Bernardino), a celebrated Italian painter, born at Perugia in 1454. He was the disciple of Peter Perugino, under whom he became so good an artist, that he employed him on many occasions as his assistant. He principally painted history and grotesque; but he also excelled in portraits, among which those of pope Pius II. and Innocent VIII. of Giulia Farnese, Cæsar Borgia, and queen Isabella of Spain, are particularly distinguished. The most memorable performance of Pinturiccio is the history of Pius II. painted in ten compartments in the history of Siena; in which undertaking, Raphael, then a young man, and bred under the same master, assisted him so far as to sketch out cartoons of many parts of the composition. The story of his death is worth relating, especially as it illustrates his character. The last work he was engaged in was a *Nativity* for the monastery of St Francis at Siena: the monks accommodated him with a chamber to work in, which they cleared of all the furniture, except one old trunk or chest that appeared too rotten to move; but Pinturiccio, naturally positive and peevish, insisting on its being taken away, the monks, willing to gratify him, complied. It was no sooner stirred than one of the planks bursting, out tumbled 500 pieces of gold, which had been secreted there for many years. The monks were overjoyed at finding this treasure, and the painter proportionably mortified at losing his chance of the discovery by his indiscreet obstinacy: it affected his spirits so much that he survived but a few months, and it was generally considered as the cause of his death.

PINUS, the PINE-TREE; a genus of the monodelphia order, belonging to the monocæcia class of plants. The pine-tree was well known to the ancients, and has been described and celebrated both by their philosophers and poets. Pliny enumerates no less than six species of trees of this genus; and it is mentioned by Virgil both in his Eclogues, his Georgics, and his *Æneid*; by Horace in his Odes; by Ovid in his *Metamorphoses*; by Statius; and by Catullus, &c. Macrobius relates a pleasant anecdote concerning the cones of

Pinna
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Pinus.

Pinus.

of pine-trees, which in common language were called *poma pinæ*, "pine-apples." There lived in the Augustan age one Vatinius, who by some means had irritated the Roman people so much that they pelted him with stones. When he entertained them with gladiators, to save himself from such treatment for the future, he procured an edict from the censors, that no person should throw any thing but apples in the amphitheatre. It accidentally happened that at this time Cascellius, eminent for his wit as well as knowledge of the law, was consulted on the question, whether a pine-apple (the cone of the pine) was legally included in the term *pomum*, "an apple?" It is an apple (said he) if you intend to sling it at Vacinius*. A decision by which the edict in his favour did not much mend his situation: for Martial represents it dangerous to come under this tree, because the cones in his time were of so great a size and weight, probably enlarged by cultivation for ages.

Nuces Pinæ.

*Poma sumus Cybeles: procul hinc discede, viator,
Ne cadat in miserum nostra ruina caput †.*

There are generally reckoned 14 species of this genus; of which the most remarkable are these following:

1. The *pinæa*, *pin-aster*, or wild pine, grows naturally on the mountains in Italy and the south of France. It grows to the size of a large tree; the branches extend to a considerable distance; and while the trees are young, they are fully garnished with leaves, especially where they are not so close as to exclude the air from those within; but as they advance in age, the branches appear naked, and all those which are situated below become unlighty in a few years; for which reason they are now much less in esteem than formerly.

2. The *pinus pinæa*, or stone pine, is a tall evergreen tree, native of Italy and Spain. It delights in a sandy loam, though like most others it will grow well in almost any land. Respecting the uses of this species, Hanbury tells us that "the kernels are eatable, and by many preferred to almonds. In Italy they are served up at table in their deserts. — They are exceeding wholesome, being good for coughs, colds, consumptions, &c. on which account only this tree deserves to be propagated." Hanbury continues: "It may be very proper here to take notice of a very great and dangerous mistake Mr Miller has committed, by saying, under this article of stone-pine, that seeds kept in the cones will be good and grow if they are sown ten or twelve years after the cones have been gathered from the trees; whereas the seeds of this sort, whether kept in the cones or taken out, are never good after the first year; and though sometimes a few plants will come up from the seeds that are kept in the cones for two years before, yet this is but seldom; neither must a tenth part of a crop be expected. This caution is the more necessary, as several gentlemen who had cones, upon reading Mr Miller's book, and finding the seeds would take no damage when kept there, deferred the work for a season or two, when they thought they should have more conveniency either of men or ground for their purpose: and were afterwards wholly disappointed, no plants appearing, the seeds being by that time spoiled and worth nothing."

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Pinus.

3. The *rubra*, commonly called the *Scots fir* or *pine*. It is common throughout Scotland, whence its name; though it is also found in most of the other countries of Europe. M. du Hamel, of the Royal Academy of Sciences, mentions his having received some seeds of it from St Domingo in the West Indies; and thence concludes, that it grows indifferently in the temperate, frigid, and torrid zones. The wood of this tree is the red or yellow deal, which is the most durable of any of the kinds yet known. The leaves of this tree are much shorter and broader than those of the former sort, of a grayish colour, growing two out of one sheath; the cones are small, pyramidal, and end in narrow points; they are of a light colour, and the seeds are small.

4. The *pinus pinæa*, or yew-leaved fir, is a tall evergreen and a native of Scotland, Sweden, and Germany. This species includes the silver fir and the balm of Gilead fir. The first of these is a noble upright tree. Mr Mussham says, "The tallest trees I have seen were spruce and silver firs in the valleys in Switzerland. I saw several firs in the dockyards in Venice 40 yards long; and one of 39 yards was 18 in diameter at the small end. I was told they came from Switzerland."

The branches are not very numerous, and the bark is smooth and delicate. The leaves grow singly on the branches, and their ends are slightly indented. Their upper surface is of a fine strong green colour, and their under has an ornament of two white lines running lengthwise on each side the midrib; on account of which silvery look this sort is called the *silver fir*. The cones are large, and grow erect; and, when the warm weather comes on, they soon shed the seeds; which should be a caution to all who wish to raise this plant, to gather the cones before that happens.

The balm of Gilead fir has of all the firs been most coveted, on account of the great fragrance of its leaves; though this is not its only good property: for it is a very beautiful tree, naturally of an upright growth, and the branches are so ornamented with their silvery leaves, as to exceed any of the other sorts in beauty. The leaves, which are very closely set on the branches, are broad; and their ends are indented. The upper surface, when healthy, is of a fine dark green colour, and their under has white lines on each side the midrib lengthwise, nearly like those of the silver fir. These leaves when bruised are very finely scented; and the buds, which swell in the autumn for the next year's shoot, are very ornamental all winter, being turgid, and of a fine brown colour; and from these also exudes a kind of fine turpentine, of the same kind of (though heightened) fragrantcy. The tree being wounded in any part, emits plenty of this turpentine; and Hanbury says, "it is supposed by many to be the sort from whence the balm of Gilead is taken, which occasions this tree being so called. But this is a mistake; for the true balm of Gilead is taken from a kind of *terebinthus*: though I am informed, that what has been collected from this tree has been sent over to England from America (where it grows naturally), and often sold in the shops for the true sort."

The silver fir is very hardy, and will grow in any soil or situation, but always makes the greatest progress in rich loamy earth. The balm of Gilead fir must be planted in deep, rich, good earth; nor will it live long

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in

Treatise on
Planting and
Ornamental
Gardening.

* Saturn.
lib. 2.
esp. 6.

† Lib. 13.
Ep. 25.

Pinus, in any other. The soil may be a black mould, or of a sandy nature, if it be deep enough, and if the roots have room enough to strike freely.

Ibid.

5. The *pinus abies*, or European spruce fir, a native of the northern parts of Europe and of Asia, includes the Norway spruce and long-coned Cornish fir. The former of these is a tree of as much beauty while growing as its timber is valuable when propagated on that account. Its growth is naturally like the silver, upright: and the height it will aspire to may be easily conceived, when we say that the white deal, so much coveted by the joiners, &c. is the wood of this tree; and it may perhaps satisfy the curious reader to know, that from this fir pitch is drawn. The leaves are of a dark green colour; they stand singly on the branches, but the younger shoots are very closely garnished with them. They are very narrow; their ends are pointed; and they are possessed of such beauties as to excite admiration. The cones are eight or ten inches long, and hang downwards.

The better the soil is, the faster will the spruce fir grow, though it will thrive very well in most of our English lands. In strong loamy earth it makes a surprising progress; and it delights in fresh land of all sorts, which never has been worn out by ploughing, &c. though it be ever so poor. The long-coned Cornish fir differs scarcely in any respect from the Norway spruce, except that the leaves and the cones are larger.

6. The *pinus Canadensis*, American or Newfoundland spruce fir, a native of Canada, Pennsylvania, and other parts of North America, includes three varieties. The white Newfoundland spruce, the red Newfoundland spruce, and the black Newfoundland spruce. These, however, differ so little, that one description is common to them all. They are of a genteel upright growth, though they do not shoot so freely or grow so fast with us as the Norway spruce. The leaves are of the same green, and garnish the branches in the same beautiful manner as those of that species; only they are narrower, shorter, and stand closer. The greatest difference is observable in the cones; for these are no more than about an inch in length, and the scales are closely placed. In the cones, indeed, consists the difference of these three sorts: those of the white species are of a very light brown colour; those of the red species more of a nut-brown or reddish colour; and those of the black species of a dark or blackish colour. Besides this, there is scarcely any material difference; though it is observable, that this trifling variation seems to be pretty constant in the plants raised from the like seeds. These sorts will often flower, and produce cones when only about five or six feet high; and indeed look then very beautiful: but this is a sign of weakness in the plant, which it does not often fairly get over.

7. The *pinus balsamea*, or hemlock fir, a native of Virginia and Canada, possesses as little beauty as any of the fir tribe; though, being rather scarce in proportion, it is deemed valuable. It is called by some the *yew-leaved fir*, from the resemblance of the leaves to those of the yew-tree. It is a tree of low growth, with but few branches; and these are long and slender, and spread abroad without order. The leaves do not garnish the branches so plentifully as those of any other sort of fir. The cones are very small and rounded; they are about

Pinus, half an inch long; and the scales are loosely arranged. We receive these cones from America, by which we raise the plants; though this caution should be given to the planter, that this tree is fond of moist rich ground, and in such a kind of soil will make the greatest progress.

8. The *pinus orientalis*, or oriental fir, a native of the East, is a low but elegant tree. The leaves are very short, and nearly square. The fruit is exceeding small, and hangs downward; and the whole tree makes an agreeable variety with the other kinds.

9. The *strobis*, Lord Weymouth's pine, or North American white pine. This grows sometimes to the height of 100 feet and upwards, and is highly valued on account of its beauty. The bark of the tree is very smooth and delicate, especially when young; the leaves are long and slender, five growing out of one sheath; the branches are pretty closely garnished with them, and thus make a fine appearance. The cones are long, slender, and very loose, opening with the first warmth of the spring; so that if they are not gathered in winter, the scales open and let out the seeds. The wood of this sort is esteemed for making masts for ships. In Queen Anne's time there was a law made for the preservation of these trees, and for the encouragement of their growth in America. Within these last 50 years they have been propagated in Britain in considerable plenty.

With respect to the culture of this species, Mr Hanbury, after some more general directions, continues thus, "I have known gentlemen, who, in attempting to raise these trees, have seen the young plants go off without perceiving the cause; and the more watering and pains they have taken, have found the plants persist in this way more and more, to their great mortification and astonishment. In the spring following these plants should be pricked out in beds half a foot asunder each way; and here they may stand two years, when they may be either finally planted out, or removed into the nursery, at the distance of one foot asunder, and two feet in the rows. If care has been taken of them in the nursery, they may be removed at a considerable height with great assurance of success: for it is much easier to make this pine grow than any of the other sorts: so that where they are wanted for ornament in parks, open places, &c. a show of them may be made in a little time.

"The soil the Weymouth pine delights in most is a sandy loam; but it likes other soils of an inferior nature: and although it is not generally to be planted on all lands like the Scotch fir, yet I have seen it luxuriant and healthy, making strong shoots, on blue and red clays, and other sorts of strong ground. On stony and sandy ground, likewise, I have seen some very fine trees; so that I believe whoever is desirous of having plantations of this pine, need not be curious in the choice of his ground."

10. The *pinus taeda*, or swamp-pine, is a tall evergreen tree, a native of the swamps of Virginia and Canada. There are several varieties of this genus which Hanbury enumerates and describes: such as, 1st, The three-leaved American swamp-pine. 2^d, The two-leaved American pine. 3^d, The yellow American pine, the yellow tough pine, and the tough pine of the plains;

Pinus.

Pinus.

among which there is but little variety. 4th, The bastard pine. 5th, The frankincense pine. And, (The dwarf pine.

"There are many (continues our author) other sorts of American pines, which we receive from thence with the like cant names of those of the above, which I have chosen to retain, as they will probably be continued to be sent over; and that the gardener receiving them as such may best know what to do with them. In many of those sorts I see at present no material difference; so am induced to think they are the same, sent over with different names. Some of the sorts above-mentioned differ in very few respects; but I have chosen to mention them, as a person may be supplied with the seeds from Pennsylvania, Jersey, Virginia, Carolina, &c. where they all grow naturally: and having once obtained the seeds, and from them plants, they will become pleasing objects of his nicest observations."

11. The *pinus cedrus*, ranked by Tournefort and others under *larix*, famous for its duration, is that popularly called by us the *cedar of Lebanon*, by the ancients *cedrus magna* or the *great cedar*; also *cedrelate*, *κεδριλευκη*, and sometimes the Phœnician or Syrian cedar, from the country where it grows in its greatest perfection. It is a coniferous evergreen, of the bigger sort, bearing large roundish cones of smooth scales, standing erect, the leaves being small, narrow, and thick set.—They sometimes counterfeit cedar, by dying wood of a reddish hue; but the smell discovers the cheat, that of true cedar being very aromatic. In some places, the wood of the cajou-tree passes under the name of cedar, on account of its reddish colour and its aromatic smell, which somewhat resemble that of santal. Cedar-wood is reputed almost immortal and incorruptible; a prerogative which it owes chiefly to its bitter taste, which the worms cannot endure. For this reason it was that the ancients used cedar tablets to write upon, especially for things of importance, as appears from that expression of Persius, *Et cedra digna locutus*. A juice was also drawn from cedar, with which they smeared their books and writings, or other matters, to preserve them from rotting; which is alluded to by Horace: by means of which it was, that Numa's books, written on papyrus, were preserved entire to the year 535, as we are informed by Pliny.

Solomon's temple, as well as his palace, were both of this wood. That prince gave king Hiram several cities for the cedars he had furnished him on these occasions. Cortes is said to have erected a palace at Mexico, in which were 7000 beams of cedar, most of them 120 feet long, and twelve in circumference, as we are informed by Herrera. Some tell us of a cedar felled in Cyprus 130 feet long, and 18 in diameter. It was used for the main-mast in the galley of king Demetrius. Læ Bruyn assures us, that the two biggest he saw on mount Lebanon, measured, one of them 57 palms, and the other 47, in circumference. In the temple of Apollo at Utica, there were cedar trees near 2000 years old; which yet were nothing to that beam in an oratory of Diana at Seguntum in Spain, said to have been brought thither 200 years before the destruction of Troy. Cedar is of so dry a nature, that it will not endure to be fastened with iron nails, from

which it usually shrinks; so that they commonly fasten it with pins of the same wood.

"The statue (says Hanbury) of the great goddess at Ephesus was made of this material; and, if this tree abounded with us in great plenty, it might have a principal share in our most superb edifices. The effluvia constantly emitted from its wood are said to purify the air, and make rooms wholesome. Chapels and places set apart for religious duties, being wainscotted with this wood, inspire the worshippers with a more solemn awe. It is not obnoxious to worms; and emits an oil which will preserve cloth or books from worms or corruption. The saw-dust will preserve human bodies from putrefaction; and is therefore said to be plentifully used in the rites of embalming, where practiced."

It is remarkable that this tree is not to be found as a native in any other part of the world than mount Libanus, as far as hath yet been discovered. What we find mentioned in Scripture of the lofty cedar can be nowise applicable to the common growth of this tree; since, from the experience we have of those now growing in England, as also from the testimony of several travellers who have visited those few remaining trees on mount Libanus, they are not inclined to grow very lofty, but on the contrary extend their branches very far; to which the allusion made by the Psalmist agrees very well, when he is describing the flourishing state of a people, and says, "They shall spread their branches like the cedar-tree."

Rauwolf, in his Travels, says, there were not at that time (i. e. anno 1574) upon mount Libanus more than 26 trees remaining, 24 of which stood in a circle; and the other two, which stood at a small distance, had their branches almost consumed with age; nor could he find any younger tree coming up to succeed them, though he looked about diligently for some. These trees (he says) were growing at the foot of a small hill, on the top of the mountains, and amongst the snow. These having very large branches, commonly bend the tree to one side, but are extended to a great length, and in so delicate and pleasant order, as if they were trimmed and made even with great diligence, by which they are easily distinguished, at a great distance, from fir-trees. The leaves (continues he) are very like to those of the larch tree, growing close together in little branches upon small brown shoots.

Maundrel, in his Travels, says, there were but 16 large trees remaining when he visited the mountain, some of which were of a prodigious bulk, but that there were many more young ones of a smaller size: he measured one of the largest, and found it to be 12 yards six inches in girth, and yet found, and 37 yards in the spread of its boughs. At about five or six yards from the ground it was divided into five limbs, each of which was equal to a great tree. What Maundrel hath related was confirmed by a gentleman who was there in the year 1720, with this difference only, viz. in the dimensions of the branches of the largest tree, which he measured, and found to be 22 yards diameter. Now, whether Mr Maundrel meant 37 yards in circumference of the spreading branches, or the diameter of them, cannot be determined by his

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words; yet either of them well agrees with this last account.

12. There is another species, viz. the *larch-tree*, which the old botanists ranked under *larix*, with deciduous leaves, and oval obtuse cones. It grows naturally upon the Alps and A. ennines, and of late has been very much propagated in Britain. It is of quick growth, and the trunk rises to 50 feet or more; the branches are slender, their ends generally hanging downward, and are garnished with long narrow leaves which rise in clusters from one point, spreading open above like the hairs of a painter's brush: they are of a light green, and fall away in autumn. In the month of April the male flowers appear, which are disposed in form of small cones; the female flowers are collected into oval obtuse cones, which in some species have bright purple tops, and in others they are white: these differences are accidental; the cones are about an inch long, obtuse at their points; the scales are smooth, and lie over each other: under each scale there are generally lodged two seeds, which have wings. There are other two varieties of this tree, one of which is a native of America, and the other of Siberia. The cones of the American kind which have been brought to Britain seem in general to be larger than those of the common sort.

"Many encomiums (says Hanbury when speaking of this species) have been bestowed on the timber of the larch: and we find such a favourable account of it in ancient authors, as should induce us to think it would be proper for almost any use. Evelyn recites a story of Witten, a Dutch writer, that a ship built of this timber and cyprus had been found in the Numidian sea, twelve fathoms under water, sound and entire, and reduced to such a hardness as to resist the sharpest tool, after it had lain submerged above 1400 years. Certain it is this is an excellent wood for ship and house building. At Venice this wood is frequently used in building their houses, as well as in Switzerland, where these trees abound: so that, without all doubt, the larch excels for masts for ships, or beams for houses, doors, windows, &c. particularly as it is said to resist the worm.

"In Switzerland (A) their houses are covered with boards of this wood cut out a foot square; and, as it emits a resinous substance, it so diffuses itself into every joint and crevice, and becomes to compact and close, as well as so hardened by the air, as to render the covering proof against all weather. But as such covering for houses would cause great devastation in case of fire, the buildings are confined to a limited distance by an order of police from the magistrates. The wood, when first laid on the houses, is said to be very white; but this colour, in two or three years is changed, by means of the sun and resin, to a black, which appears like a smooth shining varnish."

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Of the common larch there are several varieties.

The flowers which the commonest sort exhibits early in the spring are of a delicate red colour; another sort produces white flowers at the same season, and these have a delightful effect among those of the red sort; whilst another, called the *Black Newfoundland larch*, increases the variety, though by an aspect little differing from the others. There are also larches with greenish flowers, pale red, &c. all of which are accidental varieties from seeds. These varieties are easily distinguished, even when out of blow: the young shoots of the white flowering larch are of the lightest green, and the cones when ripe are nearly white. The red flowering larch has its shoots of a reddish cast, and the cones are of a brown colour; whilst the cones and shoots of the black Newfoundland larch are in the same manner proportionally tinged. The cones, which are a very great ornament to several sorts of the pines, are very little to these. Their chief beauty consists in the manner of their growth, the nature and beauty of their pencilled leaves and fair flowers; for the cones that succeed them are small, of a whitish, a reddish, or a blackish brown colour, and make no figure.

The *pinus cedrus* and *pinus larix* are propagated by sowing in March on a bed of light earth exposed to the morning sun. The seed must be covered half an inch thick with fine light earth, and the beds watered at times when the weather is dry. In about six weeks the plants will appear; they must at this time be carefully guarded from the birds, shaded from the sun and winds, and kept very clear of weeds. In the latter end of April the following year, they may be removed into beds of fresh earth, placing them at ten inches distance every way. They are to be kept here two years, and such of them as seem to bend must be tied up to a stake to keep them upright. They may afterwards be planted in the places where they are to remain. They thrive well on the sides of barren hills, and make a very pretty figure there.

Respecting the uses of this tree, Dr Pallas, in his *Flora Rossica*, informs us, that if it is burnt, and the wood consumed, the internal part of the wood distils copiously a drying reddish gum, a little less glutinous than gum arabic, somewhat of a resinous taste, but wholly soluble in water. At the instigation of M. Kintler, this gum has lately been sold in the Russian shops under the name of *gummi Orenburgensis*, but which our author thinks should be called *gummi uralienje* or *laricis*. It is eat by the Woguli as a dainty, and is said to be nutritious and antiscorbutic. Some manna was gathered from the green leaves, but it could never be confirmed. The Russians use the *boletus laricinus* as an emetic in intermittents, and to check the leucorrhœa. At Bafchir and Siberia the inhabitants sprinkle the dry powder on the wounds of oxen and horses, as a detergent and anthelmintic.

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(A) "Between Bex and Beviex (says Coxe in his *Travels in Switzerland*), I observed the larch in great plenty. Painters, from the time of Pliny to that of Raphael, trusted their works to this wood, which the Roman naturalist styles *immortale lignum*. The wood is reckoned excellent for all works which are to lie under water: and the boat-builders on the lake of Geneva prefer it for building their vessels. In these parts I saw most beautiful woods of chestnut. Haller says that they extend some leagues: he also informs us, that they are found in other parts of Switzerland, and even in desert places in some of the transalpine parts. Accident must have brought them thither, as it appears from Pliny that these trees were first introduced into Europe from Sardinia."

Pinus.

The nuts of the *pinus cembra*, the same author asserts, are eat as luxuries in Russia, and are even exported with the same view. The unripe cones give a very fragrant oil, termed balsamic. The inhabitants of Siberia use the tender tops, and even the bark rubbed off in the spring, as an antiscorbutic. The kernels of the nuts of the *amygdalus nana* give a very pleasing flavour to brandy; and, when pressed, afford a bitter oil in large quantities. The way of destroying the bitter is by distilling it in the sun with spirit of wine, and it then becomes sweet and extremely agreeable.

From the larch-tree is extracted what we erroneously call *Venice turpentine*. This substance, or natural balsam, flows at first without incision; when it has done dropping, the poor people who wait in the fir woods make incisions at about two or three feet from the ground into the trunks of the trees, into which they fix narrow troughs about 20 inches long. The end of these troughs is hollowed like a ladle; and in the middle is a small hole bored for the turpentine to run into the receiver which is placed below it. As the gummy substance runs from the trees, it passes along the sloping gutter or trough to the ladle, and from thence runs through the holes into the receiver. The people who gather it visit the trees morning and evening from the end of May to September, to collect the turpentine out of the receivers. When it flows out of the tree, Venice turpentine is clear like water, and of a yellowish white; but, as it grows older, it thickens and becomes of a citron colour. It is procured in the greatest abundance in the neighbourhood of Lyons, and in the valley of St Martin near St Lucern in Switzerland.

Though we have already noticed the manner of cultivating some of the particular species of this genus, and have also remarked the uses of some of them, we shall finish the article with a few general observations on the culture and uses of the whole.

Culture. All the sorts of pines are propagated by seeds produced in hard woody cones. The way to get the seeds out of these cones is to lay them before a gentle fire, which will cause the cells to open, and then the seeds may be easily taken out. If the cones are kept entire, the seeds will remain good for some years; so that the surest way of preserving them is to let them remain in the cones till the time for sowing the seeds. If the cones are kept in a warm place in summer, they will open and emit the seeds; but if they are not exposed to the heat, they will remain close for a long time. The best season for sowing the pines is about the end of March. When the seeds are sown, the place should be covered with nets to keep off the birds; otherwise, when the plants begin to appear with the bulk of the seed on the top of them, the birds will peck off the tops, and thus destroy them.

Uses. From the first species is extracted the common turpentine, much used by farriers, and from which is drawn the oil of that name. The process of making pitch, tar, resin, and turpentine, from these trees is very singular. In the spring time, when the sap is most free in running, they pare off the bark of the pine tree, to make the sap run down into a hole which they cut at the bottom to receive it. In the way, as it runs down, it leaves a white matter like cream, but

a little thicker. This is very different from all the kinds of resin and turpentine in use, and it is generally sold to be used in the making of flambeaux instead of white bees wax. The matter that is received in the hole at the bottom is taken up with ladles, and put in a large basket. A great part of this immediately runs through, and this is the common turpentine. This is received into stone or earthen pots, and is ready for sale. The thicker matter, which remains in the basket, they put into a common alembic, adding a large quantity of water. They distil this as long as any oil is seen swimming upon the water. This oil they separate from the surface in large quantities, and this is the common oil or spirit of turpentine. The remaining matter at the bottom of the still is common yellow resin. When they have thus obtained all that they can from the sap of the tree, they cut it down, and hewing the wood into billets, they fill a pit dug in the earth with these billets, and setting them on fire, there runs from them, while they are burning, a black thick matter. This naturally falls to the bottom of the pit, and this is the tar. The top of the pit is covered with tiles, to keep in the heat; and there is at the bottom a little hole, out at which the tar runs like oil. If this hole be made too large, it sets the whole quantity of the tar on fire, but, if small enough, it runs quietly out.

The tar, being thus made, is put up in barrels; and if it be to be made into pitch, they put it into large boiling vessels, without adding any thing to it. It is then suffered to boil a while, and being then let out, is found when cold to be what we call pitch.

A decoction of the nuts or seeds of the first species in milk, or of the extremities of the branches pulled in spring, is said, with a proper regimen, to cure the most inveterate scurvy. The wood of this species is not valued; but that of the Scots pine is superior to any of the rest. It is observable of the Scots pine, that when planted in bogs, or in a moist soil, though the plants make great progress, yet the wood is white, soft, and little esteemed; but when planted in a dry soil, though the growth of the trees is there very slow, yet the wood is proportionally better. Few trees have been applied to more uses than this. The tallest and straightest are formed by nature for masts to our navy. The timber is resinous, durable, and applicable to numberless domestic purposes, such as flooring and wainscoting of rooms, making of beds, chests, tables, boxes, &c. From the trunk and branches of this, as well as most others of the pine tribe, tar and pitch is obtained. By incision, *barras*, *Burgundy pitch*, and turpentine, are acquired and prepared. The resinous roots are dug out of the ground in many parts of the Highlands, and, being divided into small pieces, are used by the inhabitants to burn instead of aniles.—At Loch-Broom, in Kots thire, the fishermen make ropes of the inner bark; but hard necessity has taught the inhabitants of Sweden, Lapland, and Kamtschatka, to convert the same into bread. To effect this, they, in the spring season, make choice of the tallest and fairest trees; then stripping off carefully the outer bark, they collect the soft, white, succulent interior bark, and dry it in the shade. When they have occasion to use it, they first toast it at the fire, then grind, and af-

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Pioneers
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Pipe

ter steeping the flour in warm water to take off the resinous taste, they make it into thin cakes, which are baked for use. On this strange food the poor inhabitants are sometimes constrained to live for a whole year; and, we are told, through custom, become at last even fond of it. Linnæus remarks, that this same bark-bread will fatten swine; and humanity obliges us to wish, that men might never be reduced to the necessity of robbing them of such a food. The interior bark, of which the above mentioned bread is made, the Swedish boys frequently peel off the trees in the spring, and eat raw with greedy appetite. From the cones of this tree is prepared a diuretic oil, like the oil of turpentine, and a resinous extract, which has similar virtues with the balsam of Peru. An infusion or tea of the buds is highly commended as an antiscorbutic. The farina, or yellow powder, of the male-flowers, is sometimes in the spring carried away by the winds, in such quantities, where the trees abound, as to alarm the ignorant with the notion of its raining brimstone. The tree lives to a great age; Linnæus affirms to 400 years.

PIONEERS, in the art of war, are such as are commanded in from the country, to march with an army for mending the ways, for working on intrenchments and fortifications, and for making mines and approaches. The soldiers are likewise employed for all these purposes. Most of the foreign regiments of artillery have half a company of pioneers, well instructed in that important branch of duty. Our regiments of infantry and cavalry have three or four pioneers each, provided with aprons, hatchets, saws, spades, and pick-axes. Each pioneer must have an ax, a saw, and an apron; a cap with a leather crown, and a black bears-skin front, on which is to be the king's crest in white, on a red ground; and the number of the regiment is to be on the back part of it.

PIP, or PEP, a disease among poultry, consisting of a white thin skin, or film, that grows under the tip of the tongue, and hinders their feeding. It usually arises from want of water, or from the drinking puddle-water, or eating filthy meat. It is cured by pulling off the film with the fingers, and rubbing the tongue with salt. Hawks are particularly liable to this disease, especially from feeding on stinking flesh.

PIPE, in building, &c. a canal, or conduit, for the conveyance of water and other liquids. Pipes for water, water-engines, &c. are usually of lead, iron, earth, or wood: the latter are usually made of oak or elder. Those of iron are cast in forges; their usual length is about two feet and a half: several of these are commonly fastened together by means of four serews at each end, with leather or old hat between them, to stop the water. Those of earth are made by the potters; these are fitted into one another, one end being always made wider than the other. To join them the closer, and prevent their breaking, they are covered with tow and pitch: their length is usually about that of the iron pipes. The wooden pipes are trees bored with large iron augres, of different sizes, beginning with a less, and then proceeding with a larger successively; the first being pointed, the rest being formed like spoons, increasing in diameter, from one to six inches or more: they are fitted into the ex-

tremities of each other (as represented fig. 2.), and are sold by the foot. Pipe.

Woolen pipes are bored as follows. The machine represented fig. 1. is put in motion by the wheel A, which is moved by a current of water; upon the axle of this wheel is a cog wheel B, which causes the lanterns C, D, to turn horizontally, whose common axis is consequently in a perpendicular direction. The lantern D turns at the same time two cog-wheels, E and F: the first, E, which is vertical, turns the augre which bores the wood; and the second, F, which is horizontal, causes the carriage bearing the piece to advance by means of the arms H, I, which takes hold of the notches in the wheel K. The first, H, by means of the notches, draws the wheel towards F; and the other, I, pushes the under-post of the wheel in an opposite direction; both which motions tend to draw the carriage towards F, and consequently cause the augre to pierce the wood. The augre being from 9 to 12 feet in length, and of a proportionable bigness, it will be necessary to have two pieces, as L, L, to support its weight, and cause it to enter the piece to be bored with the same uniformity.

For the construction of leaden pipes, see the article PLUMBERY.

Air-PIPES. See *Air-Pipes*.

PIPES of an Organ. See *ORGAN*.

Bag-PIPE. See *BAG-PIPE*.

HORN-PIPE. See *HORNPIPE*.

Tobacco-PIPE, a machine used in the smoking of tobacco, consisting of a long tube, made of earth or clay, having at one end a little case, or furnace, called the *bowl*, for the reception of the tobacco, the fumes whereof are drawn by the mouth through the other end. Tobacco-pipes are made of various fashions; long, short, plain, worked, white, varnished, unvarnished, and of various colours, &c. The Turks use pipes three or four feet long, made of rushes, or of wood bored, at the end whereof they fix a kind of a pot of baked earth, which serves as a bowl, and which they take off after smoking.

PIPE, also denotes a vessel or measure for wine, and things measured by wine-measure. See *BARREL* and *MEASURE*.

PIPE, in mining, is where the ore runs forwards endwise in a hole, and doth not sink downwards or in a vein.

PIPE, *Pipa*, in law, is a roll in the exchequer, called also the *great roll*. See the next article.

PIPE-Office, is an office wherein a person called the *clerk of the pipe*, makes out leases of crown-lands, by warrant from the lord-treasurer, or commissioners of the treasury, or chancellor of the exchequer. The clerk of the pipe makes out also all accounts of sheriffs, &c. and gives the accountants their *quietus est*. To this office are brought all accounts which pass the remembrancer's office, and remain there, that if any stated debt be due from any person, the same may be drawn down into the great roll of the pipe: upon which the comptroller issues out a writ, called the *summons of the pipe*, for recovery thereof; and if there be no goods or chattels, the clerk then draws down the debts to the lord treasurer's remembrancer, to write estreats against their lands. All tallies which vouch the

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the payment of any sum contained in such accounts are examined and allowed by the chief secondary of the pipe. Besides the chief clerk in this office, there are eight attorneys or sworn clerks, and a comptroller.

PIPE Fish, in ichthyology. See SYNGNATHUS.

Sea-PIPES, in zoology. are univalve shells, of an oblong figure, terminating in a point, sometimes a little bending, and sometimes straight. Sea ears, figures of which we have given along with the sea-pipes, are also univalve flat shells, resembling in shape the ear of a man. In sea ears it is not uncommon to find small pearls, the seeds of which are often found in the middle of their cavities, which are of the finest naker or mother-of-pearl colour. There are ridges on both sides; those without form a kind of volute or spire, terminating in an eye. In these shells there is a row of round holes, six of which generally go quite through.

There is a shell of this kind, which is longer in proportion to its width, and much less common, for it is never found in our seas. There is yet another, very fine and thin, of a dirty grey colour, neither naked nor perforated as the others are; the inner rim is spiral, and at some distance from the outer.

The sea-pipes are distinguished from sea-worms by having their pipes single; whereas the others form an assemblage of pipes joined together. The sea worms, from the number and junction of their parts, are multivalves. The shells of pipes called *dentales* and *antales* are distinguished from each other only by their size, the antales being much the least. The *sea pencil*, or *watering spout*, is the most remarkable shell of this tribe, and must be considered as having a specific character either by its form, which is straight, or the singularity of its superior extremity, which is perforated like the spout of a watering pot.

In Plate CCCXCII. the shell, fig. 1. pierced with many holes, is found with its natural covering in our seas. It is finely naked within, and in the middle of its hollow or cavity contains many small pearls. Fig. 2. is placed on its upper side to show its spots, which are red upon a ground of the purest white; the ridges are prominent; the rim and the eye are irregular and notched. Fig. 4. the singularity of this shell consists in its being neither naked nor perforated, and in turning very much up near the eye of its spire or contour. Fig. 5. is a pencil or watering spout; at the head is a kind of ruff, and within it is formed like the end of a watering spout, perforated with many holes, which, when the fish is alive, are filled with very fine threads, like the hairs of a painter's pencil. Fig. 6. are called *dentals* from their resemblance of elephants teeth; the point or apex is white, and the other extremity green. They are both ribbed and naked, and are distinguished from each other only by some excrescences which appear on the uppermost. Fig. 7. are two small shells of the dental figure, called for distinction *antales*. They are perfectly smooth; one is white, and the other reddish.

PIPER, in ichthyology. See TRICLA.

Piper.

PIPER, *Pepper*; a genus of the trigynia order, belonging to the diandria class of plants. There are 20 species, of which the most remarkable is the *siroboa*, with oval, heart-shaped, nerved leaves, and reflexed spikes. This is the plant which produces the pepper so much used in food. It is a shrub whose root is small, fibrous, and flexible; it rises into a stem, which requires a tree or a prop to support it. Its wood has the same sort of knots as the vine; and when it is dry, it exactly resembles the vine-branch. The leaves, which have a strong smell and a pungent taste, are of an oval shape; but they diminish towards the extremity, and terminate in a point. From the flower-buds, which are white, and are sometimes placed in the middle and sometimes at the extremity of the branches, are produced small berries resembling those of the currant-tree. Each of these contains between 20 and 30 corns of pepper; they are commonly gathered in October, and exposed to the sun seven or eight days. The fruit, which was green at first, and afterwards red, when stripped of its covering assumes the appearance it has when we see it. The largest, heaviest, and least shrivelled, is the best.

The pepper plant flourishes in the islands of Java, Sumatra (A), and Ceylon, and more particularly on the Malabar coast. It is not sown, but planted; and great nicety is required in the choice of the shoots. It produces no fruit till the end of three years; but bears so plentifully the three succeeding years, that some plants yield between six and seven pounds of pepper. The bark then begins to shrink; and the shrub declines so fast, that in 12 years time it ceases bearing.

The culture of pepper is not difficult: it is sufficient to plant it in a rich soil, and carefully to pull up the weeds that grow in great abundance round its roots, especially the three first years. As the sun is highly necessary to the growth of the pepper plant, when it is ready to bear, the trees that support it must be lopped to prevent their shade from injuring the fruit. When the season is over, it is proper to crop the head of the plant. Without this precaution, there would be too much wood, and little fruit.

The pepper exported from Malabar, which was formerly entirely in the hands of the Portuguese, and is at present divided between the Dutch, British, and French, amounts to about 10,000,000 weight. Betel, or betle, is a species of this genus. See BETEL. It is a creeping and climbing plant like the ivy; and its leaves a good deal resemble those of the citron, though they are longer and narrower at the extremity. It grows in all parts of India, but thrives best in moist places. The natives cultivate it as we do the vine, placing props for it to run and climb upon; and it is a common practice to plant it against the tree which bears the areca-nut.

At all times of the day, and even in the night, the Indians chew the leaves of the betel, the bitterness of which is corrected by the areca that is wrapped up in them. There is constantly mixed with it the chinam, a kind of burnt lime made of shells. The rich frequent-ly

(A) See a copious account of the mode of cultivating pepper in Sumatra, in Mr Marsden's *History of Sumatra* or in the *New Annual Register* for 1783, p. 147.

Piper.

sy add perfumes, either to gratify their vanity or their sensuality.

It would be thought a breach of politeness among the Indians to take leave for any long time, without presenting each other with a purse of betel. It is a pledge of friendship that relieves the pain of absence. No one dares to break to a superior unless his mouth is perfumed with betel; it would even be rude to neglect this precaution with an equal. The women of gallantry are the most lavish in the use of betel, as being a powerful incentive to love. Betel is taken after meals; it is chewed during a visit; it is offered when you meet, and when you separate; in short, nothing is to be done without betel. If it is prejudicial to the teeth, it assuages and strengthens the stomach. At least, it is a general fashion that prevails throughout India.

London Medical Journal, vol. viii. part iii. p. 270, &c.

The *piper amalago*, or black pepper, and the *piper inaequalis*, or long pepper of Jamaica, with some other species, are indigenous, and known by the names of *joint wood*, or *peppery elders*. The first bears a small spike, on which are attached a number of small seeds of the size of mustard. The whole of the plant has the exact taste of the East India black pepper. The long pepper bush grows taller than the *amalago*. The leaves are broad, smooth, and shining. The fruit is similar to the long pepper of the shops, but smaller. The common people in Jamaica season their messes with the black pepper. To preserve both, the fruit may be slightly scalded when green, then dried, and wrapped in paper. Perhaps hereafter they may be deemed worthy of attention.

PIPRA, in ornithology; a genus of birds of the order of *passeres*. Latham gives it the name of *manakin*, and so does Buffon, who informs us that it was bestowed upon them by the Dutch settlers in Surinam. Latham describes 25 different species, and five varieties. The general character of the genus is, that the bill is short, strong, hard, and slightly incurved, and the nostrils are naked. The middle toe is connected to the outer as far as the third joint: this character, however, is not altogether universal, some of the species differing in this particular. The tail is short. This genus has a considerable resemblance to the genus *parus*, or titmouse. They are supposed to inhabit South America only; but this is not true, for Mr Latham assures us that he has seen many of these species which he has described which came from other parts, but which nevertheless certainly belong to this genus.—Buffon differs widely in his arrangement from Mr Latham and only enumerates six distinct species. Without particularizing those differences, however, we shall give from Buffon the following elegant account of the genus in general: "The natural habits common to them all were not known, and the observations which have been made are still insufficient to admit an exact detail. We shall only relate the remarks communicated to us by Sonini of Manoncourt, who saw many of these birds in their native climates. They inhabit the immense forests in the warm parts of America, and never emerge from their recesses to visit the cleared grounds or the vicinity of the plantations. They fly with considerable swiftness, but always at a small height, and to short distances; they never perch on the summits of trees, but on the middle branches; they feed upon

small wild fruits, and also eat insects. They generally occur in small bodies of eight or ten of the same species, and sometimes intermingled with other flocks of the same genus, or even of a different genus, such as the Cayenne warblers, &c. It is commonly in the morning that they are found thus assembled, and then seem to be joyous, and warble their delicate little notes. The freshness of the air seems to inspire the song, for they are silent during the burning heat of the day, and disperse and retire to the shade of the thickest parts of the forest. This habit is observed, indeed, in many kinds of birds, and even in those of the woods of France, where they collect to sing in the morning and evening; but the manakins never assemble in the evening, and continue together only from sun-rise to nine or ten o'clock in the forenoon, and remain separate during the rest of the day and the succeeding night. In general they prefer a cool humid situation, though they never frequent marshes or the margins of lakes."

1. The *pipra rupicola*, or crested manakin, is about the size of a small pigeon, being about 10 or 12 inches long. The bill is about an inch and a quarter long, and of a yellowish colour. The head is furnished with a double round crest; the general colour of the plumage is orange, inclining to saffron; the wing coverts are loose and fringed; the quills are partly white and partly brown; the tail feathers are in number 12; the base half of the ten middle ones is of an orange colour, from thence to the ends they are brown; the outer feathers are brown, and the base half of the inner web is orange; all of them are similarly fringed; the upper tail coverts are very long, loosely webbed, and square at the ends; the legs and claws are yellow. The female is altogether brown, except the under wing coverts, which are of a rufous orange; the crest is neither so complete nor rounded as that of the male. Both males and females are at first grey, or of a very pale yellow, inclining to brown. The male does not acquire the orange colour till the second year, neither does the female the full brown.

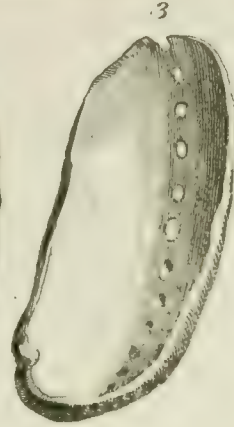
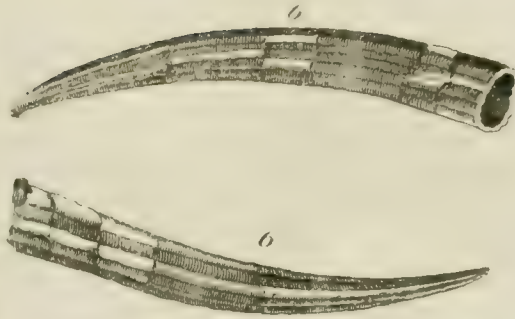
"This beautiful species (says Latham), inhabits various parts of Surinam, Cayenne, and Guiana, in rocky situations; but is nowhere so frequent as in the mountain Luca, near the river Oyapoc, and in the mountain Courouaye, near the river Aprouack, where they build in the cavernous hollows, and the darkest recesses. They lay two round white eggs, the size of those of a pigeon, and make the nest of a few dry bits of sticks. They are in general very shy; but have been frequently tamed, inasmuch as to run at large among the poultry. It is said that the female, after she has laid eggs for some years, and ceases so to do more, becomes at the ensuing moult of the same colour as the male, and may be mistaken for him; in this imitating the females of various kinds of poultry, such as the peacock, pheasant, &c. (See Pavo, &c.) A most complete pair is in the Leverian Museum." Our author describes a variety of this species, which he calls the *Peruvian manakin*. It is longer than the preceding, especially in the tail, and the upper coverts of it are not truncated at the ends; the wing coverts are not fringed, as in the rock manakin, and the crest is not so well defined as in that bird; the general colour of the plumage inclines much to red; the second

Pipra.

Phoenicopterus Ruber
The Flamingo.



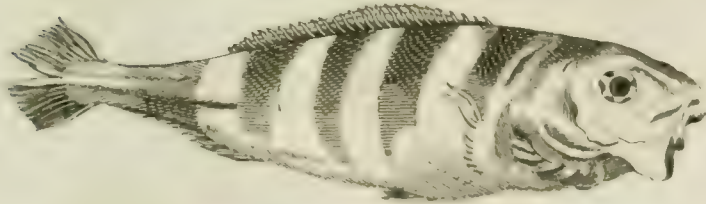
Sea conch & Pipes.



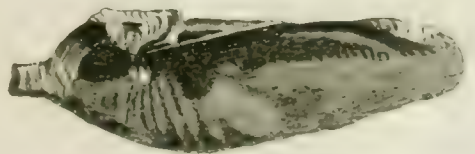
Pinna.



Pilot fish.



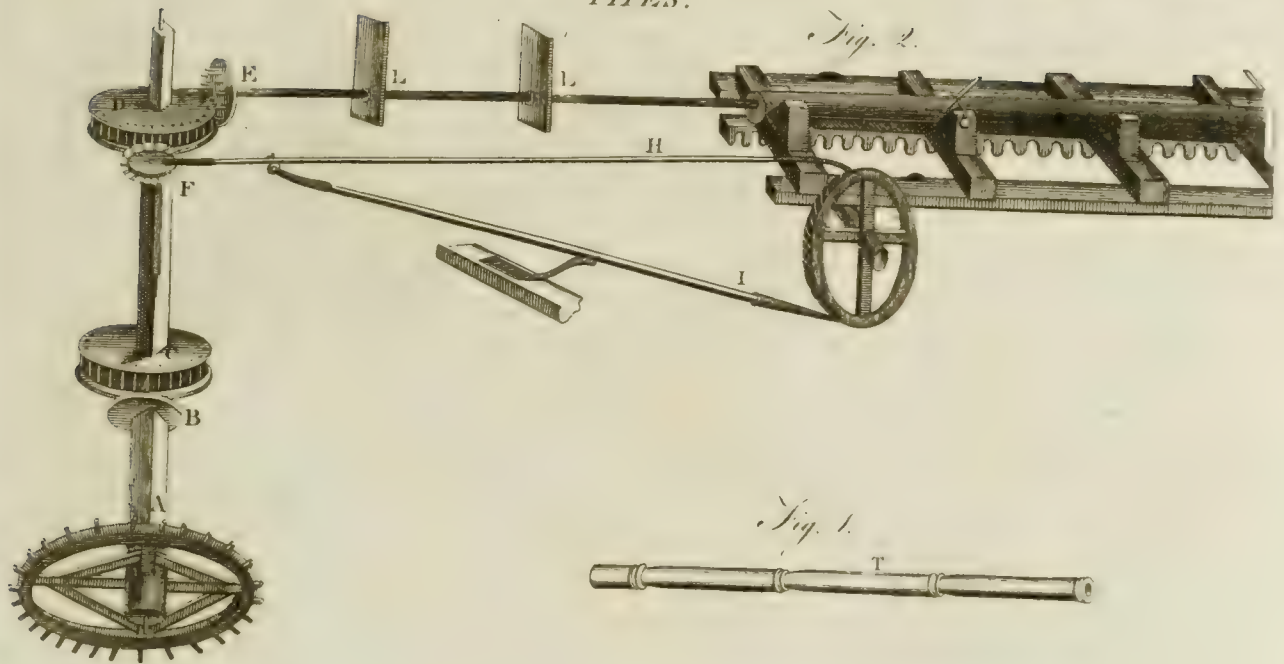
Pholas.



Pholas.

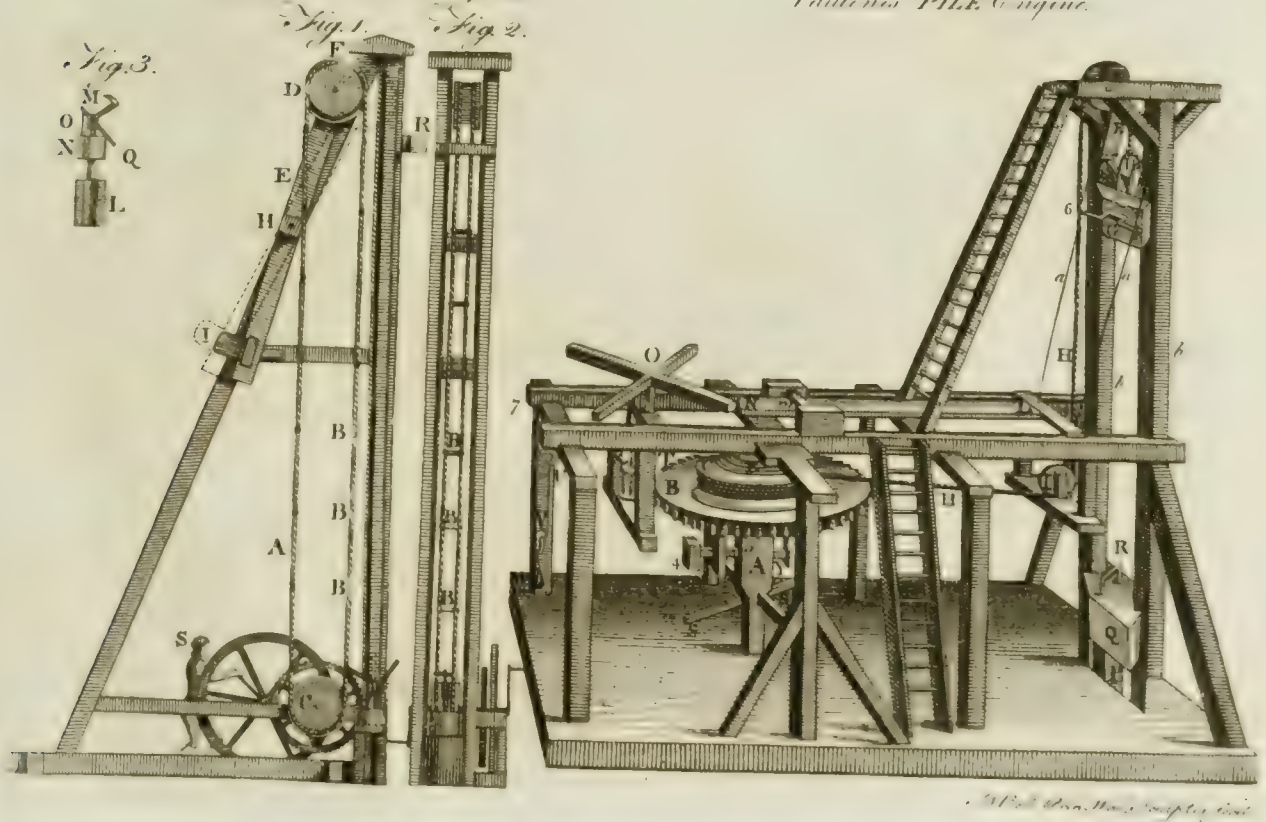
*Machine for boring wooden
PIPES.*

Plate CCCXCIII



Burrows' PILE Engine.

Wardner's PILE Engine.



cond coverts and rump are of an ash colour; the wings and tail are black; the bill and legs are as in the last described. It is an inhabitant of Peru, from whence its name.

2. The next and last species which we shall describe (for it would be impossible to enumerate them all), Mr Latham calls the *tuneful manakin*. Its length is four inches; the bill is dusky, the forehead yellow, and the crown and nape blue; the chin, sides of the head below the eyes, and the throat, are black; the upper part of the back, the wings, and the tail, are dusky black; the tail is very short; the lower part of the back and rump, the breast, belly, vent, and thighs, are orange coloured; the legs are dusky. It is a native of St Domingo, where it has gained the name of *organiste* from its note, forming the complete octave in the most agreeable manner, one note successively after another. It is said not to be uncommon, but not easy to be shot, as, like the creeper, it perpetually shifts to the opposite part of the branch from the spectator's eye, so as to elude his vigilance. It is most likely the very bird mentioned by Du Prutz, above quoted, whose notes, he says, are so varied and sweet, and which warbles so tenderly, that those who have heard it value much less the song of the nightingale. It is said to sing for near two hours without for ever taking breath, and after a respite of about the same time begins again. Du Prutz, who himself has heard it, says that it sung perched on an oak, near the house he was then in.

PIQUET, or PICKET, a celebrated game at cards, much in use throughout the polite world.

It is played between two persons, with only 32 cards; all the aces, threes, fours, fives, and sixes, being set aside.

In reckoning at this game, every card goes for the number it bears, as a ten for ten; only all court cards go for ten, and the ace for eleven: and the usual game is one hundred up. In playing, the ace wins the king, the king the queen, and so down.

Twelve cards are dealt round, usually by two and two; which done, the remainder are laid in the middle: if one of the gamesters finds he has not a court-card in his hand, he is to declare he has *carte-blanche*, and tell how many cards he will lay out, and desire the other to discard, that he may show his game, and satisfy his antagonist that the *carte-blanche* is real; for which he reckons ten.

Each person discards, *i. e.* lays aside a certain number of his cards, and takes in a like number from the stock. The first of the eight cards may take three, four, or five; the dealer all the remainder, if he pleases.

After discarding, the eldest hand examines what suit he has most cards of; and reckoning how many points he has in that suit, if the other have not so many in that or any other suit, he tells one for every ten of that suit. He who thus reckons most is said to win the point.

The point being over, each examines what *sequences* he has of the same suit, *viz.* how many *tierces*, or sequences of three, *quartes* or fours, *quintes* or fives, *sixiemes*, or six's, &c. For a tierce they reckon three points, for a quarte four, for a quinte 15, for a sixieme 16, &c. And the several sequences are distinguished in dignity by the cards they begin from: thus ace

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king, and queen, are called *tierce major*; king, queen, and knave, *tierce to a king*; knave, ten, and nine, *tierce to a knave*, &c. and the best tierce, quarte, or quinte, *i. e.* that which takes its descent from the best card, prevails, so as to make all the others in that hand good, and destroy all those in the other hand. In like manner, a quarte in one hand sets aside a tierce in the other.

The sequences over, they proceed to examine how many aces, kings, queens, knaves, and tens, each holds; reckoning for every three of any sort, three: but here too, as in sequences, he that with the same number of threes has one that is higher than any the other has, *e. gr.* three aces, has all his others made good hereby, and his adversary's all set aside. But four of any sort, which is called a *quatorze*, always sets aside three.

All the game in hand being thus reckoned, the eldest proceeds to play, reckoning one for every card he plays above a nine, and the other follows him in the suit; and the highest card of the suit wins the trick. Note, unless a trick be won with a card above a nine (except the last trick), nothing is reckoned for it; though the trick serves afterwards towards winning the cards; and that he who plays last does not reckon for his cards unless he wins the trick.

The cards being played out, he that has most tricks reckons ten for winning the cards. If they have tricks alike, neither reckons any thing. The deal being finished, and each having marked up his game, they proceed to deal again as before, cutting afresh each time for the deal.

If both parties be within a few points of being up, the *carte blanche* is the first thing that reckons, then the point, then the sequences, then the quatorzes or threes, then the tenth cards.

He that can reckon 30 in hand by *carte-blanche*, points, quintes, &c. without playing, ere the other has reckoned any thing, reckons 90 for them; and this is called a *repique*. If he reckons above 30, he reckons so many above 90. If he can make up 30, part in hand and part play, ere the other has told any thing, he reckons for them 60. And this is called a *pique*. Whence the name of the game. He that wins all the tricks, instead of ten, which is his right for winning the cards, reckons 40. And this is called a *capot*.

Mr de Moivre, who has made this game the object of mathematical investigation, has proposed and solved the following problems: 1. To find at piquet the probability which the dealer has for taking one ace or more in three cards, he having none in his hand. He concludes from his computation, that it is 27 to 28 that the dealer takes one ace or more. 2. To find at piquet the probability which the eldest has of taking an ace or more in five cards, he having no ace in his hand. Answer: 232 to 91, or 5 to 2, nearly. 3. To find at piquet the probability which the eldest hand has of taking an ace and a king in five cards, he having none in his hand. Answer: the odds against the eldest hand taking an ace and a king are 331 to 315, or 21 to 20 nearly. 4. To find at piquet the probability of having 12 cards dealt to, without king, queen, or knave, which case is commonly called *carte-blanches*. Answer: the odds against *carte-blanches* are 1791 to 1 nearly.

Pira.

nearly. 5. To find how many different sets, essentially different from one another, one may have at piquet before taking in. Answer; 28,967,278. This number falls short of the sum of all the distinct combinations, whereby 12 cards may be taken out of 32, this number being 225,792,840; but it must be considered that in that number several sets of the same import, but differing in suit, might be taken, which would not introduce an essential difference among the sets. The same author gives also some observations on this game, which he had from an experienced player. See *Doctrine of Chances*, p. 179, &c. M. de Moirnot has treated of piquet in his *Analyse des Jeux de Hazard*, p. 162.

PIRA, is a name by which a variety of foreign fishes are distinguished. The *pira-aca* is a little horned fish of the West Indies, called by Clusius and others the *monoceros* or *unicorn fish*. The *pira-acangata* is the name of a Brazilian fish, which resembles the perch both in size and shape. It seldom exceeds four or five inches in length; its mouth is small; its tail forked. On the back it has only one long fin, which is supported by rigid and prickly spines. This fin it can depress at pleasure, and sink within a cavity made for it in the back. Its scales are of a silvery white colour; it is wholesome and well tasted. *Pira-bebe* is the name of the milvus, or kite-fish. *Pira-coaba* is an American fish of the truttaceous kind, of a very delicate flavour. It grows to the length of 12 inches; its nose is pointed, and its mouth large, but without teeth; the upper jaw is longer than the under one, and hangs over like a cartilaginous prominence; its eyes are very large, and its tail is forked; under each of the gill fins there is a beard made of six white filaments, and covered with silvery scales. *Pira-jurumbeca* is a Brazilian fish, otherwise called *bocca molle*. It lives in the muddy bottom of the American seas, and is a long bodied not flattened fish. It grows to a great size, being found nine, and sometimes even ten or eleven, feet long, and two feet and a half thick. It has one long fin on the back, the anterior part of which is thin and pellucid. There is also a cavity on the back, as in the *pira-acangata*, into which the fin can be depressed at pleasure; the tail is not forked, and the scales are all of a silvery colour and brightness. The fish is very well tasted; the *pira-pixanga* is another Brazilian fish of the turdus or wrasse kind, and called by some the *galvifish*. It is generally about four or five inches long; its mouth is pretty large, and furnished with very small and very sharp teeth; its head is small, but its eyes are large and prominent, the pupil being of a fine turquoise colour, and the iris yellow and red in a variety of shades. The coverings of the gills end in a triangular figure, and are terminated by a short spine or prickle; its scales are very small, and so evenly arranged, and closely laid on the flesh, that it is very smooth to the touch; its tail is rounded at the end; its whole body, head, tail, and fins, are of a pale yellow colour, variegated all over with very beautiful blood-coloured spots; these are round, and of the bigness of hemp-seed on the back and sides, and something larger on the belly; the fins are all spotted in the same manner, and are all marked with an edge of red. It is caught among the rocks, and about the shores, and is a very well tasted fish. *Piranba* is an American fish, more generally

Piræus.

known by the name *piraya*. *Piraguiba*, or *Ipiraguiba*, is the name of a fish originally Brazilian, which some writers apply to the *remora* or *sucking fish*.

PIRÆUS PORTUS, (anc. geog.), a celebrated port to the west of Athens, consisting, naturally of three harbours or basons, (Thucydides); which lay neglected, till Themistocles put the Athenians on making it a commodious port, (Nepos); the Phalerus, a small port, and not far from the city, being what they used before that time, (Pausanias, Nepos). Piræus was originally a village of Attica, (Pausanias); an island, (Strabo); and though distant 40 stadia from Athens, was joined to it by two long walls, (Thucydides), and itself locked or walled round, (Nepos): A very commodious and safe harbour. The whole of its compass was 60 stadia, including the Munichia. Not far from the Piræus stood the sepulchre of Themistocles; whither his friends conveyed his bones from Magnesia, into the Hither Asia, (Cicero, Plutarch, Pausanias). The entrance of the Piræus is narrow, and formed by two rocky points, one belonging to the promontory of Eetion, the other to that of Alcmus. Within were three stations for shipping; Kantharus, so named from a hero; Aphrodisium, from a temple of Venus; and Zea, the resort of vessels laden with grain. By it was a demos or borough town of the same name before the time of Themistocles, who recommended the exchanging its triple harbour for the single one of Phalerum, both as more capacious and as better situated for navigators. The wall was begun by him when archon, in the second year of the 75th Olympiad, 477 years before Christ; and afterwards he urged the Athenians to complete it as the importance of the place deserved. This whole fortification was of hewn stone, without cement or other material, except lead and iron, which were used to hold together the exterior ranges or facings. It was so wide that the loaded carts could pass on it in different directions, and it was 40 cubits high, which was about half what he had designed.

The Piræus, as Athens flourished, became the common emporium of all Greece. Hippodamus an architect, celebrated, besides other monuments of his genius, as the inventor of many improvements in house building, was employed to lay out the ground. Five porticoes, which uniting formed the *Long Portico*, were erected by the ports. Here was an *agora* or market-place, and, farther from the sea, another called *Hippodamia*. By the vessels were dwellings for the mariners. A theatre was opened, temples were raised, and the Piræus, which surpassed the city in utility, began to equal it in dignity. The cavities and windings of Munychia, natural and artificial, were filled with houses; and the whole settlement, comprehending Phalerum and the ports of the Piræus, with the arsenals, the storehouses, the famous armoury of which Philo was the architect, and the sheds for 300, and afterwards 400, triremes, resembled the city of Rhodes, which had been planned by the same Hippodamus. The ports, on the commencement of the Peloponnesian war, were secured with chains. Centinels were stationed, and the Piræus was carefully guarded.

The Piræus was reduced with great difficulty by Sylla, who demolished the walls, and set fire to the armoury and arsenals. In the civil war it was in a defenceless condition. Calenus, lieutenant to Cæsar, seized

Piræus,
Piracy.

feized it, invested Athens, and ravaged the territory. Strabo, who lived under the emperors Augustus and Tiberius, observes, that the many wars had destroyed the long walls, with the fortrefs of Munychia, and had contracted the Piræus into a small settlement by the ports and the temple of Jupiter Saviour. This fabric was then adorned with wonderful pictures, the works of illustrious artists, and on the outside with statues. In the second century, besides houses for triremes, the temple of Jupiter and Minerva remained, with their images in brass, and a temple of Venus, a portico, and the tomb of Themistocles.

The port of the Piræus has been named *Porto Leone*, from the marble lion seen in the chart, and also *Porto Draco*. The lion has been described as a piece of admirable sculpture, 20 feet high, and as reposing on its hinder parts. It was pierced, and, as some have conjectured, had belonged to a fountain. Near Athens, in the way to Eleusis, was another, the posture couchant; probably its companion. Both these were removed to Venice by the famous general Morosini, and are to be seen there before the arsenal. At the mouth of the port are two ruined piers. A few vessels, mostly small craft, frequent it. Some low land at the head seems an incroachment on the water. The buildings are a mean customhouse, with a few sheds; and by the shore on the east side, a warehouse belonging to the French; and a Greek monastery dedicated to St Spiridion. On the opposite side is a rocky ridge, on which are remnants of the ancient wall, and of a gateway towards Athens. By the water-edge are vestiges of building; and going from the customhouse to the city on the right hand, traces of a small theatre in the side of the hill of Munychia.

PIRACY, the crime of robbery and depredation upon the high seas.

By the ancient common law, piracy, if committed by a subject, was held to be a species of treason, being contrary to his natural allegiance; and by an alien, to be felony only: but now, since the statute of treasons, 25 Edw. III. c. 2. it is held to be only felony in a subject. Formerly it was only cognizable by the admiralty courts, which proceed by the rules of the civil law. But, it being inconsistent with the liberties of the nation, that any man's life should be taken away, unless by the judgment of his peers, or the common law of the land, the statute 28 Hen. VIII. c. 15. established a new jurisdiction for this purpose; which proceeds according to the course of the common law.

The offence of piracy, by common law, consists in committing those acts of robbery and depredation upon the high seas, which, if committed upon land, would have amounted to felony there. But, by statute, some other offences are made piracy also: as, by statute 11 and 12 W. III. c. 7. if any natural-born subject commits any act of hostility upon the high seas, against others of his majesty's subjects, under colour of a commission from any foreign power; this, though it would only be an act of war in an alien, shall be construed piracy in a subject. And farther, any commander, or other seafaring person, betraying his trust, and running away with any ship, boat, ordnance, ammunition, or goods; or yielding them up volunta-

rily to a pirate; or conspiring to do these acts; or any person assailing the commander of a vessel, to hinder him from fighting in defence of his ship; or confining him, or causing or endeavouring to cause a revolt on board; shall, for each of these offences, be adjudged a pirate, felon, and robber, and shall suffer death, whether he be principal, or merely accessory by setting forth such pirates, or abetting them before the fact, or receiving or concealing them or their goods after it. And the statute 4 Geo. I. c. 11. expressly excludes the principals from the benefit of clergy. By the statute 8 Geo. I. c. 24. the trading with known pirates, or furnishing them with ammunition, or fitting out any vessel for that purpose, or in anywise consulting, combining, confederating, or corresponding with them; or the forcibly boarding any merchant vessel, though without seizing or carrying her off, and destroying or throwing any of the goods overboard; shall be deemed piracy: and such accessories to piracy as are described by the statute of king William are declared to be principal pirates; and all pirates convicted by virtue of this act are made felons without benefit of clergy. By the same statutes also, (to encourage the defence of merchant-vessels against pirates), the commanders or seamen wounded, and the widows of such seamen as are slain, in any piratical engagement, shall be entitled to a bounty to be divided among them, not exceeding one fiftieth part of the value of the cargo on board: and such wounded seamen shall be intitled to the pension of Greenwich hospital; which no other seamen are, except only such as have served in a ship of war. And if the commander shall behave cowardly, by not defending the ship, if she carries guns or arms; or shall discharge the mariners from fighting, so that the ship falls into the hands of pirates; such commander shall forfeit all his wages, and suffer six months imprisonment. Lastly, by statute 18 Geo. II. c. 30. any natural born subject or denizen, who in time of war shall commit hostilities at sea against any of his fellow-subjects, or shall assist an enemy on that element, is liable to be tried and convicted as a pirate.

PIRATE, (*καρπαισιν*, Gr.); a sea-robber, or an armed ship that roams the seas without any legal commission, and seizes or plunders every vessel she meets indiscriminately, whether friends or enemies.

The colours usually displayed by pirates are said to be a black field, with a death's head, a battle-axe, and hour-glass. The last instrument is generally supposed to determine the time allowed to the prisoners, whom they take, to consider whether they will join the pirates in their felonious combination, or be put to death, which is often perpetrated in the most cruel manner.

Amongst the most celebrated pirates of the north is recorded Alvilda, daughter of a king of the Goths named *Sypardus*. She embraced this occupation to deliver herself from the violence imposed on her inclination, by a marriage with Alf, son of Sigarus king of Denmark. She dressed herself as a man; and composed her band of rowers, and the rest of her crew, of a number of young women attired in the same manner. Amongst the first of her cruizes, she touched at a place where a company of pirates bewailed the

Piracy,
Pirate.

Pirone
Piron.

death of their captain. The strangers were captivated with the agreeable manners of Alvilda, and chose her for their chief. By this reinforcement she became so formidable upon the sea, that prince Alf came to engage her. She sustained his attacks for a considerable time; but, in a vigorous action, Alf boarded her vessel, and having killed the greatest part of her crew, seized the captain, namely herself; whom nevertheless he knew not, because the princess had a casque which covered her visage. Being master of her person, he removed the casque; and in spite of her disguise, instantly recognized her, and offered her his hand in wedlock.

PIRENE, (Pliny); a fountain sacred to the muses, springing below the top of the Acrocorinthus, a high and steep mountain which hangs over Corinth. Its waters were agreeable to drink, (Pausanias); extremely clear, (Strabo); very light, (Athenaeus); and pale, (Perfius); having relation either to the grief of Pirene, mother of Cenchreae, from whose tears this fountain arose, (Pausanias); or to the paleness brought on by the too eager pursuits of the muses.

PIROMALLI (Paul), a dominican of Calabria, was sent a missionary into the east. He remained a long time in Armenia, where he had the happiness to bring back to the church many schismatics and Eutycheans, and the patriarch himself, who had before thrown every obstacle in his way. He afterwards passed into Georgia and Persia, then into Poland, in quality of Pope Urban VIII.'s nuncio, in order to appease the disturbances which had been occasioned there by the disputes of the Armenians, who were very numerous in that country. Piromalli reunited them in the profession of the same faith and observance of the same ceremonies. In his return to Italy, he was taken by some Corsairs who carried him prisoner to Tunis. As soon as he was ransomed, he went to Rome, and gave an account of his mission to the pope, who conferred upon him some signal marks of his esteem. His holiness entrusted him with the revival of an Armenian Bible, and sent him again into the east, where he was promoted, in 1655, to the bishopric of Nisivan. After having governed that church for nine years, he returned to Italy, and took the charge of the church of Basignano, where he died three years after in 1667. His charity, his zeal, and other virtues did honour to the Episcopal office. There are extant of his writings, 1. Some works of Controversy and Theology. 2. Two Dictionaries; the one a Latin-Perfian, and the other an Armenian-Latin. 3. An Armenian Grammar. 4. A Directory, which is of great use in correcting Armenian books. All these works equally distinguish him for virtue and for learning.

PIRON (Alexis), whose father was an apothecary, was born at Dijon the 9th of July 1689, where he passed more than 30 years in the idle and destructive dissipation too common to young men. He was at length obliged to quit the place of his nativity, in order to avoid the reproaches of his fellow citizens, on account of an ode which he had written, and which gave great offence. His relations not being able to give him much assistance, he supported himself at Paris by means of his pen, the strokes of which were as beautiful and fair as those of an engraver. He lived in the house of M. de Belisle as his secretary, and afterwards with a financier, who did not know that he had a man of ge-

nus under his roof. His reputation as a writer commenced with some pieces which he published for the entertainment of the populace, and which showed strong marks of original invention; but what fully established his character in this way was his comedy intitled *Métromanie*, which was the best that had appeared in France since Regnard's *Gamister*. This performance, in five acts, well conducted, replete with genius, wit, and humour, was acted with the greatest success upon the French stage in 1738. The author met with every attention in the capital which was due to a man of real genius, and whose flashes of wit were inexhaustible. We shall insert a few anecdotes of him, which will serve to show his character and turn of mind. In Burgundy the inhabitants of Beaune are called the *Asses of Beaune*. Piron often indulged his satirical disposition at their expence. One day as he was taking a walk in the neighbourhood of that city, he diverted himself with cutting down all the thistles which he met with. When a friend asked him his reason for doing so, he replied, *J'ai à me plaindre des Beaunois; je leur coupe les vivres*, i. e. "I am sorry indeed for the Beaunians; for I am cutting down their food." Being told again that these people would certainly be revenged of him,

Alliez, (says he) Alliez: je ne crains point leur impuissant courroux;

Et, quand je serois seul, je les batteroïs tous.

"Get you gone, get you gone: I fear not their feeble revenge; for tho' alone, I should beat them all." Going into a theatre one time where a play was acting, he asked what it was? The Cheats of Scapin, gravely replied a young Beaunian. "Ah! Sir, (says Piron, after thanking him), I took it to be the Cheats of Oracles." In the time of the play, some body addressed the company with "Silence there, gentlemen, we don't hear." "It is not at least (cried Piron) for want of ears." A bishop one day asked Piron, during the disputes about Jansenism, "Did you read my mandate, Mr Piron?" "No, my lord; and you—The conversation turning very warm, the bishop reminded him of the distance which birth and rank had put between them. "Sir (says Piron), I have plainly the superiority over you at this moment; for I am in the right, and you are in the wrong."—Voltaire's *Semiramis* did not meet with a very favourable reception the first time it was acted. The author finding Piron behind the scenes, asked him what he thought of his performance? "I think (replied he) you would have been pleased that I had been the author of it." The performer of the character Ferdinand Cortez (the title of one of Piron's Tragedies) having requested some corrections to be made on the play the first time it was acted, Piron fired at the word *corrections*. The player, who was deputed to wait upon the author with this request, cited the example of Voltaire, who corrected some of his pieces in order to gratify the taste of the public. "The cases are widely different (replied Piron); Voltaire works in chequer-work, and I cast in brass." If this answer be not very modest, we must allow that it does not want wit. He thought himself, if not superior, at least equal to Voltaire. Some person congratulating him on having composed the best comedy of this age, he answered, with more frankness than modesty, "Add too, and the best tragedy." The following verses are well known, in which he says:

En

Piron,
Pisa.*En deux mots voulez-vous distinguer & connoître**Le rimeur Dijonnois & le Parisien ?**Le premier ne fut rien, & ne voulut rien être ;**L'autre voulut tout être, & ne fut presque rien.*

We see by these different traits that Piron had a sufficient stock of self-conceit. What helped to increase it, and make him fancy himself superior to the most celebrated of his contemporaries, was, that his company, on account of his original humour, or which he had an uncommon share, was more courted than that of Voltaire, who was otherwise too lively, too captious, and crabbed. But those who have favoured us with an account of his many witticisms in conversation, would have done more honour to his memory if they had passed over such as were either indelicate or insipid. A thing often pleases over a glass of wine, which will not give the same satisfaction when it is repeated, especially if, in repeating it, you want to make it appear of some importance. Be that as it may, Piron's mischievous ingenuity was partly the cause which excluded him from the French Academy.—"I could not (said he) make thirty nine people think as I do, and I could still less think as thirty-nine do." He called that celebrated society very unjustly *les invalides du bel esprit*, "the invalids of wit;" and yet he often endeavoured to be one of those invalids. His death was hastened by a fall which he got a little before. He died the 21st of January 1773, at the age of 83. He had prepared for himself the following epitaph, in the way of an epigram :

*Ci gît Piron, qui ne fut rien,**Pas même académicien.*

"Here lies Piron, who was nothing, not even an academicien."

His wife Maria Theresa Quenandon, who died in 1751, he describes as a sweet and most agreeable companion. They lived together for several years; and no husband ever discharged his duty with more fidelity and attention.

A collection of his works appeared in 1776, in 7 vol. 8vo, and 9 vol. 12mo. The principal pieces are, *The School of Fathers*; a comedy acted in 1728 under the title of *Ungrateful Sons*. *Callisthenes*; a tragedy, the subject of which is taken from *Justin*. *The Mysterious Lover*, a comedy. *Gustavus and Ferdinand Cortez*, two tragedies; some scenes of which discover an original genius, but the versification neither pleases the ear nor affects the heart. *Metromany*, a comedy. *The Courses of Tempe*, an ingenious pastoral, in which the manners both of the town and country are pleasantly drawn. Some odes, poems, fables, and epigrams. In this last kind of poetry he was very successful, and he may be placed after Marot and Ronsseau. There was no occasion for loading the public with 7 vols of his works; the half of that number might have sufficed. For, excepting *Metromany*, *Gustavus*, the *Courses of Tempe*, some odes, about 25 epigrams, three or four fables, and some epistles, the rest are but indifferent, and have no claim to any extraordinary merit.

PISA, a large town of Tuscany in Italy, situated on the river Arno, 52 miles from Florence. It was a famous republic, till subdued, first by the duke of Milan, and then by the Florentines in the year 1406. Before it lost its freedom, it is said to have contained near 150,000 inhabitants, but now it has not above 16,000

Pisa.

or 17,000. It was founded, we are told by the Pisans of Peloponnesus, and afterwards became one of the 12 municipia of Tuscany. Its neighbourhood to Leghorn, which is now the chief port in the Mediterranean, though formerly of little or no note for trade, has contributed greatly to the decay of Pisa, which, however, begins to lift up its head a ram, under the auspices of the present grand duke, who has made it his winter residence. Between Pisa and Leghorn is a canal 16 Italian miles in length.—Its territory is very fruitful; abounding in corn, wine, and fruit, and fine cattle. The houses are well built, and the streets even, broad, and well paved; but in many places over-run with grass. The university is well endowed, and has able professors, but is not in a very flourishing condition. The exchange is a stately structure, but little frequented. The grand duke's galleys are built, and commonly stationed here. This city is also the principal residence of the order of St Stephen, and the see of an archbishop. The cathedral, a large Gothic pile, contains a great number of excellent paintings and other curiosities. This church is dedicated to St Mary; is very advantageously situated in the middle of a large piazza, and built out of a great heap of wrought marble, such as pillars, pedestals, capitals, cornices, and architraves, part of the spoils which the Pisans took in their eastern expeditions, when the republic was in a flourishing condition. The roof is supported by 76 high marble pillars of different colours, and finely gilt. Both the church and the cupola are covered with lead. The choir is painted by good hands, and the floor is mosaic work. The brazen doors are curiously wrought with the history of the Old and New Testament, by Bonanno, an ancient statuary. The chapel of St Rainerius is richly adorned with gilt metals, columns of porphyry, and fine paintings. In the middle of the nave of the church you see two brazen tombs, raised upon pillars. The marble pulpit was carved by John Pisano, and the choir by Julian da Majana. Joining thereto is the altar, over which is preserved a hollow globe or vessel of marble, wherein they kept the sacrament for the new baptized, according to the opinion of Father Mabillon. In the square before the church, you see a pillar upon which is the measure of the ancient Roman talent. In the same square with the dome, stands the baptistry, a round fabric supported by stately pillars, and remarkable for a very extraordinary echo.

On the north side of the cathedral is the burying place, called *Campo Santo*, being covered with earth brought from the Holy Land. This burying place is inclosed with a broad portico, well painted, and paved with grave stones. Here are a great many ancient tombs, among the rest that of Beatrix, mother of the countess Mathilda, with marble basso-reliefs, which the Pisans brought from Greece, where you see the hunt of Meleager, which assisted Nicholas of Pisa in the restoration of sculpture. The walls of the Campo Santo are painted by the best masters of their times. Giotto has drawn six historical pieces of Job; and Andrea Orcagna has given a fine piece of the last judgment. Under the portico there is a decree of the city, ordering the inhabitants to wear mourning a year for the death of Caesar. Near the church you see a steeple in the form of a cylinder, to which you ascend by

Pisa
||
Piscidia.

Piscidia
||
Pisistratus.

by 153 steps; it inclines 15 feet on one side, which some ascribe to art, but others to the sinking of the foundation. Its inclination is so great that a plumb-line let fall from the top touches the ground at the distance of almost 15 feet from the bottom. It was built by John of Inspruck and Bonanno of Pisa, in 1174. Near this steeple is a fine hospital, dependent on that of St Maria Nuova in Florence.

The steeple of the church of the Augustinians is also very fine, being an octagon, adorned with pillars, and built by Nicholas of Pisa. In the great market-place there is a statue of Plenty, by Pierino da Vinci. In the church of St Matthew, the painting of the ceiling by the brothers Melani, natives of this city, is an admired performance. The church of the knights of St Stephen, decorated with the trophies taken from the Saracens, is all of marble, with marble steps, and a front adorned with marble statues. In the square there is a statue of Cosmo I. upon a very fine pedestal. Contiguous to the church is the convent or palace of the knights, which is worth seeing, as also the churches Della Madonna and Della Spina; the last of which was built by a beggar, whose figure you may see on the outside of the wall. It is pretended that one of the thorns of the crown which was placed on our Saviour's head is preserved here. Belonging to the university there is a great number of colleges, the chief of which is the Sapienza, where the professors read their public lectures; next to which are the colleges Puteano, Ferdinando, Ricci, and others. Besides the public palace, and that of the grand duke, there are several others with marble fronts, the finest of which is that of Lanfranchi, which, with the rest along the banks of the Arno, makes a very fine appearance. There is here a good dock, where they build the galleys, which are conveyed by the Arno to Leghorn. They have a famous aqueduct in this town, consisting of 5000 arches, which conveys the water from the hills at five miles distance. This water is esteemed the best in Italy, and is carried in flasses to Florence and Leghorn. The neighbouring country produces great store of corn and wine, but the latter is not much esteemed. They have very good butter in this neighbourhood, which is a scarce commodity in Italy. The city for its defence has a moat, walls, a castle, fort, and citadel; the last of which is a modern work. The Arno is of a considerable breadth here, and has three bridges over it, one of them of marble: two leagues below the town it falls into the sea. The physic-garden is very spacious, contains a great number of plants, and is decorated with water-works: over the door leading into it are these words, *Hic Argus sed non Briareus esto*: i. e. Employ the eyes of Argus, but not the hands of Briareus. The air is said to be unwholesome here in summer, on account of the neighbouring morasses. Many buffaloes are bred in the neighbouring country, and their flesh is commonly eaten. Between Pisa and Lucca are hot baths. E. Long. 10. 17. N. Lat. 43. 43.

PISCARY, in our ancient statutes, the liberty of fishing in another man's waters.

PISCES, in astronomy, the 12th sign or constellation of the zodiac.

PISCIDIA, a genus of the decandria order, belonging to the diadelphica class of plants. There are

two species, viz. 1. The erythrina, or dog-wood tree. This grows plentifully in Jamaica, where it rises to the height of 25 feet or more; the stem is almost as large as a man's body, covered with a light-coloured smooth bark, and sending out several branches at the top without order; the leaves are about two inches long, winged, with oval lobes. The flowers are of the butterfly kind, and of a dirty white colour; they are succeeded by oblong pods, with four longitudinal wings, and jointed between the cells which contain the seeds. 2. The Carthaginiensis, with oblong oval leaves, is also a native of the West Indies. It differs from the former only in the shape and consistence of the leaves, which are more oblong and stiffer; but in other respects they are very similar. Both species are easily propagated by seeds; but require artificial heat to preserve them in this country.—The negroes in the West Indies make use of the bark of the first species to intoxicate fish. When any number of gentlemen have an inclination to divert themselves with fishing, or, more properly speaking, with fish-hunting, they send each of them a negro-slave to the woods, in order to fetch some of the bark of the dog-wood tree. This bark is next morning pounded very small with stones, put into old sacks, carried into rocky parts of the sea, steeped till thoroughly soaked with salt-water, and then well squeezed by the negroes to express the juice. This juice immediately colours the sea with a reddish hue; and, being of a poisonous nature, will in an hour's time make the fishes, such as groopers, rock-fish, old wives, Welchmen, &c. so drunk or intoxicated, as to swim on the surface of the water, quite heedless of the danger: the gentlemen then send in their negroes, who pursue, both swimming and diving, the poor inebriated fishes, till they catch them with their hands; their masters in mean time standing by, on high rocks, to see the pastime.

It is remarkable, that though this poison kills millions of the small fry, it has never been known to impart any bad quality to the fish which have been caught in consequence of the intoxication.

The wood of this tree, although pretty hard, is only fit for fuel; and even for this purpose the negroes very seldom, if ever, employ it, on account of its singular quality just mentioned. The bark is rough, brown, and thick; the tree sends forth a considerable number of branches, and is well clothed with leaves, which resemble those of the pea, are thick, cottony, and of a deep green. The bark used for the above-mentioned purpose is chiefly that of the roots.

PISCINA, in antiquity, a large basin in a public place or square, where the Roman youth learned to swim; and which was surrounded with a high wall, to prevent filth from being thrown into it.—This word is also used for a lavatory among the Turks, placed in the middle court of a mosque or temple, where the Mussulmen wash themselves before they offer their prayers.

PISISTRATUS, an Athenian who early distinguished himself by his valour in the field, and by his address and eloquence at home. After he had rendered himself the favourite of the populace by his liberality and by the intrepidity with which he had fought their battles, particularly near Salamis, he resolved to make himself master of his country. Every thing seemed

Bibliotheca
Classica by
Lempriere.

Pisistratus. ed favourable to his ambitious views; but Solon alone, who was then at the head of affairs, and who had lately enforced his celebrated laws, opposed him, and discovered his duplicity and artful behaviour before the public assembly. Pisistratus was not disheartened by the measures of his relation Solon, but he had recourse to artifice. In returning from his country-house, he cut himself in various places; and after he had exposed his mangled body to the eyes of the populace, deplored his misfortunes, and accused his enemies of attempts upon his life, because he was the friend of the people, the guardian of the poor, and the reliever of the oppressed, he claimed a chosen body of 50 men from the populace to defend his person in future from the malevolence and the cruelty of his enemies. The unsuspecting people unanimously granted his request, though Solon opposed it with all his influence; and Pisistratus had no sooner received an armed band on whose fidelity and attachment he could rely, than he seized the citadel of Athens, and made himself absolute. The people too late perceived their credulity; yet, though the tyrant was popular, two of the citizens, Megacles and Lycurgus, conspired together against him, and by their means he was forcibly ejected from the city. His house and all his effects were exposed to sale; but there was found in Athens only one man who would buy them. The private dissensions of the friends of liberty proved favourable to the expelled tyrant; and Megacles, who was jealous of Lycurgus, secretly promised to restore Pisistratus to all his rights and privileges in Athens, if he would marry his daughter. Pisistratus consented; and by the assistance of his father-in-law, he was soon enabled to expel Lycurgus, and to re-establish himself. By means of a woman called *Phya*, whose shape was tall, whose features were noble and commanding, he imposed upon the people, and created himself adherents even among his enemies. *Phya* was conducted through the streets of the city, and showing herself subservient to the artifice of Pisistratus, she was announced as *Minerva*, the goddess of wisdom, and the patroness of Athens, who was come down from Heaven to re-establish her favourite Pisistratus in a power which was sanctioned by the will of Heaven, and favoured by the affection of the people. In the midst of his triumph, however, Pisistratus found himself unsupported; and some time after, when he repudiated the daughter of Megacles, he found that not only the citizens, but even his very troops, were alienated from him by the influence, the intrigues, and the bribery of his father-in-law. He fled from Athens where he no longer could maintain his power, and retired to Eubœa. Eleven years after he was drawn from his obscure retreat, by means of his son Hippias, and he was a third time received by the people of Athens as their master and sovereign. Upon this he sacrificed to his resentment the friends of Megacles, but he did not lose sight of the public good, and while he sought the aggrandizement of his family, he did not neglect the dignity and the honour of the Athenian name. He died about 528 years before the Christian era, after he had enjoyed the sovereign power at Athens for 33 years, and he was succeeded by his son Hippiarchus. Pisistratus claims our admiration for his justice, his liberality, and his moderation. If he was dreaded and detested as a tyrant, the Athenians loved and respect-

ed his private virtues and his patriotism as a fellow-citizen; and the opprobrium which generally falls on his head may be attributed not to the severity of his administration, but to the republican principles of the Athenians, who hated and exclaimed against the moderation and equity of the mildest sovereign, while they flattered the pride and gratified the guilty desires of the most tyrannical of their fellow subjects. Pisistratus often refused to punish the insolence of his enemies; and when he had one day been virulently accused of murder, rather than inflict immediate punishment upon the man who had criminated him, he went to the areopagus, and there convinced the Athenians that the accusations of his enemies were groundless, and that his life was irreproachable. It is to his labours that we are indebted for the preservation of the poems of Homer; and he was the first, according to Cicero, who introduced them at Athens in the order in which they now stand. He also established a public library at Athens; and the valuable books which he had diligently collected were carried into Persia when Xerxes made himself master of the capital of Attica. Hippiarchus and Hippias the sons of Pisistratus, who have received the name of *Pisistratidæ*, rendered themselves as illustrious as their father; but the flames of liberty were too powerful to be extinguished. The *Pisistratidæ* governed with great moderation, but the name of tyrant or sovereign was insupportable to the Athenians. Two of the most respectable of the citizens, called *Harmodius* and *Aristogiton*, conspired against them, and Hippiarchus was dispatched in a public assembly. This murder was not, however, attended with any advantages; and though the two leaders of the conspiracy, who have been celebrated through every age for their patriotism, were supported by the people, yet Hippias quelled the tumult by his uncommon firmness and prudence, and for a while preserved that peace in Athens which his father had often been unable to command. This was not long to continue. Hippias was at last expelled by the united efforts of the Athenians and of their allies, and he left Attica, when he found himself unable to maintain his power and independence. The rest of the family of Pisistratus followed him in his banishment; and after they had refused to accept the liberal offers of the princes of Thessaly, and the king of Macedonia, who wished them to settle in their respective territories, the *Pisistratidæ* retired to Sigæum, which their father had in the summit of his power conquered and bequeathed to his posterity. After the banishment of the *Pisistratidæ*, the Athenians became more than commonly jealous of their liberty, and often sacrificed the most powerful of their citizens, apprehensive of the influence which popularity and a well-directed liberality might gain among a fickle and unsettled populace. The *Pisistratidæ* were banished from Athens about 18 years after the death of Pisistratus.

PISMIREs. are a kind of insects very common in Africa; of which there is so great a variety, and such innumerable swarms, that they destroy not only the fruits of the ground but even men and beasts in so little a time as one single night; and would, without all doubt, prove more fatally destructive to the inhabitants, were they not so happily destroyed by a proportionable number of monkeys, who greedily ferret and devour them.

Pisistratus.
Pismires.

them. For a further account of these, and some other grievous plagues with which the far greater part of the vast continent of Africa is afflicted, particularly that most horrid visitation of locusts, which seldom fail a year of lying waste some of the provinces, see GRAYL-
LUS. p. 161.

PISO (Lucius Calpurnius), surnamed *Frugi* on account of his frugality, was descended of the illustrious family of the Pisos, which gave so many great men to the Roman republic. He was tribune of the people in the year 147 before Christ, and afterwards consul. During his tribuneship, he published a law against the crime of concussion or extortion, intitled *Lex Calpurnia de pecuniis repetundis*. He happily ended the war in Sicily. To reward the services of one of his sons, who had distinguished himself in that expedition, he left him by his will a golden crown, weighing 20 pounds. Piso joined to the qualities of a good citizen the talents of a lawyer, an orator, and historian.

Piso (Caius Calpurnius), a Roman consul in the year 67 before Christ, was author of the law which forbade canvassing for public offices, intitled *Lex Calpurnia de ambitu*. He displayed all the firmness worthy of a consul in one of the most stormy periods of the republic. The Roman people, deceived by the flattery of Marcus Calpurnius, a turbulent and seditious fellow, were on the eve of loading themselves with the greatest disgrace, by putting the supreme authority into the hands of this man, who deserved punishment rather than honours. The tribunes of the people, by their harangues, inflamed the blind fury of the multitude, already sufficiently mutinous of themselves. In this situation, Piso mounted the rostrum, and being asked if he would declare Calpurnius consul, in case the suffrages of the people should concur in the nomination, he instantly replied, that "he did not think the republic was yet involved in such darkness and despair as to be capable of committing so infamous an action." Being afterwards strongly and repeatedly called upon to say, "what he would do, if the thing should happen?" his answer was, "No, I would not name him." By this firm and laconic answer he deprived Calpurnius of the dignity to which he aspired. Piso, according to Cicero, was not possessed of a quick conception, but he thought maturely, and with judgment, and, by a proper firmness, he appeared to be an abler man than he really was.

Piso (Cneius Calpurnius), was consul in the reign of Augustus, and governor of Syria under Tiberius, whose confident he was. It is said, that by the order of this emperor he caused Germanicus to be poisoned. Being accused of that crime, and seeing himself abandoned by every body, he laid violent hands on himself in the 20th year of our Lord. He was a man of insupportable pride and excessive violence. Some instances of his wicked cruelty have been handed down to us. Having given orders in the heat of his passion to conduct to punishment a soldier, as guilty of the death of one of his companions, because he had gone out of the camp with him and returned without him, no prayers or intreaty could prevail with Piso to suspend the execution of this sentence until the affair should be properly investigated. The soldier was led without the entrenchments, and had already presented his head to receive the fatal stroke, when his compa-

nion whom he was accused of having killed made his appearance again. Whereupon the centurion, whose office it was to see the sentence executed, ordered the executioner to put up his sword into the scabbard. Those two companions, after embracing each other, are conducted to Piso, amidst the acclamations of the whole army, and a prodigious crowd of people. Piso, foaming with rage, ascends his tribune, and pronounces the same sentence of death against the whole three, without excepting the centurion who had brought back the condemned soldier; in these terms: "You I order to be put to death because you have been already condemned; you, because you have been the cause of the condemnation of your comrade; and you, because having got orders to put that soldier to death, you have not obeyed your prince."

PISSASPHALTUM, EARTH-PITCH; a fluid, opaque, mineral body, of a thick consistence, strong smell, readily inflammable, but leaving a residuum of greyish ashes after burning. It arises out of the cracks of the rocks, in several places in the island of Sumatra, and some other places in the East Indies, where it is much esteemed in paralytic disorders. There is a remarkable mine of it in the island of Bua, (see BUA), of which the following curious description is given us by the Abbé Fortis. "The island is divided into two promontories between the north and west, crossing over the top of the latter, which is not half a mile broad, and descending in a right line towards the sea, one is conducted to a hole well known to the inhabitants. This hole extends not much above 12 feet, and from its bottom above 25 feet perpendicular, arise the marble strata which sustain the irregular masses that surround the top of the mountain.

"The place seemed to me (continues our author), so worthy of observation, that I caused a drawing of it to be taken. The hole AAA is dug out of an irregular stratum of argillaceous sandy earth, in some parts whitish, and in others of a greenish colour; part of it is half petrified, and full of numismata of the largest kind, lenticulares, and fragments, with here and there a small branch of madrepores, and frequently of those other fossil bodies called by Gesner *cornua ammonis candida, minima, &c.* The mass B is fallen from the height of the rock, and lies isolated. The excavation, made by some poor man in the softer matter, reaches a little below the extremity CC of the stratum DD. This is separated by the line EE from the stratum FF, which is of hard common marble, with marine bodies without flints. The upper part aa is of hard lenticular stone, interspersed with flints full of lenticulares. The mass H does not discover the divisions of its strata on the outside, and transpires very small drops of pissasphaltum, scarcely discernible; but the tears III of the same matter which flow from the fissures and chinks of the whitish stratum DD, are very observable. They come out most abundantly when the sun falls on the marble rock in the heat of the day. This pissasphaltum is of the most perfect quality, black and shining like the *bitumen Judaicum*; very pure, odorous, and cohesive. It comes out almost liquid, but hardens in large drops when the sun sets. On breaking many of these drops on the spot, I found that almost every one of them had an inner cavity full of very clear water.

Plate
CCCXCVII.

Pissalæum. "The greatest breadth of the tears that I saw was two inches, and the common breadth is half an inch. The chinks and fissures of the marble, from whence this bituminous pitch transudes, are not more than the thickness of a thread; and for the most part are so imperceptible, that were it not for the pitch itself, whereby they are blackened, they could not by any means be distinguished by the naked eye. To the narrowness of these passages is, no doubt, in part owing the small quantity of pissasphaltum that transpires."

After some conjectures about the origin of this mine, our author proceeds to inform us that the pissasphaltum of Bua is correspondent to that fossil production which by Hasselquist, in his Travels, is called *mumia minerale*, and *mumia nativa Persiana* by Kempfer, which the Egyptians made use of to embalm their kings (A). It is found in a cave of mount Caucasus, which is kept shut, and carefully guarded by order of the king of Persia. One of the qualities assigned by M. Linnæus to the finest bitumen is to smoke when laid on the fire, as ours does, emitting a smell of pitch not disagreeable. He believes it would be very good for wounds, as the oriental mumia is, and like the pitch of Castro, which is frequently used by the Roman surgeons for fractures, contusions, and in many external applications. See MINERALOGY.

PISELÆUM INDICUM, *Barbadoes Tar*; a mineral fluid of the nature of the thicker bitumens, and of all others the most approaching, in appearance, colour, and consistence, to the true pissasphaltum, but differing from it in other respects. It is very frequent in many parts of America, where it is found trickling down the sides of mountains in large quantities, and sometimes floating on the surface of the waters. It has been greatly recommended internally in coughs and other disorders of the breast and lungs.

PISTACIA, **TURPENTINE-TREE**, *Pistachia-nut* and *Mastich-tree*; a genus of the pentandria order, belonging to the dioecia class of plants. There are nine species; of which the most remarkable are, 1. The terebinthus, or pistachia-tree. This grows naturally in Arabia, Persia, and Syria, whence the nuts are annually brought to Europe. In those countries it grows to the height of 25 or 30 feet: the bark of the stem and old branches is of a dark russet colour, but that of the young branches is of a light brown. These are garnished with winged leaves, composed sometimes of two, at other times of three, pair of lobes, terminated by an odd one: these lobes approach towards an oval shape, and their edges are turned backward; and these, when

bruised, emit a smell similar to that of the shell of the nut. Some of these trees produce male and others female flowers, and some have both male and female on the same tree. The male flowers come out from the sides of the branches in loose bunches or catkins. They have no petals, but five small stamina crowned by large four-cornered summits filled with farina; and when this is discharged, the flowers fall off. The female flowers come out in clusters from the sides of the branches: they have no petals, but a large oval germen supporting three reflexed styles, and are succeeded by oval nuts. 2. The lentiscus, or common mastich-tree, grows naturally in Portugal, Spain, and Italy. Being an evergreen, it has been preserved in this country in order to adorn the green-houses. In the countries where it is a native, it rises to the height of 18 or 20 feet, covered with a grey bark on the stem; but the branches, which are very numerous, are covered with a reddish-brown bark, and are garnished with winged leaves, composed of three or four pair of small spear-shaped lobes, without an odd one at the end. 3. The orientalis, or true mastich-tree of the Levant, from which the mastich is gathered, has been confounded by most botanical writers with the lentiscus, or common mastich tree, above described, though there are considerable differences between them. The bark of the tree is brown; the leaves are composed of two or three pair of spear-shaped lobes, terminated by an odd one: the outer lobes are the largest; the others gradually diminish, the innermost being the least. These turn of a brownish colour towards the autumn, when the plants are exposed to the open air; but if they are under glasses, they keep green. The leaves continue all the year, but are not so thick as those of the common sort, nor are the plants so hardy.

Culture. The first species is propagated by its nuts; which should be planted in pots filled with light kitchen-garden earth, and plunged into a moderate hot-bed to bring up the plants: when these appear, they should have a large share of air admitted to them, and by degrees they should be exposed to the open air, which at last they will bear in all seasons, though not without great danger of being destroyed in severe winters. The second sort is commonly propagated by laying down the branches, though it may also be raised from the seed in the manner already directed for the pistachia-nut tree: and in this manner also may the true mastich-tree be raised. But this being more tender than any of the other sorts, requires to be constantly sheltered in winter, and to have a warm situation in summer.

5 F

Pistachia

(A) "Mumiali, or native Persian mummy. It proceeds from a hard rock in very small quantity. It is a bituminous juice, that transudes from the stony superficies of the hill, resembling in appearance coarse shoemakers wax, as well in its colour as in its density and ductility. While adherent to the rock it is less solid, but is formed by the warmth of the hands. It is easily united with oil, but repels water; it is quite void of smell, and very like in substance to the Egyptian mummy. When laid on burning coals, it has the smell of sulphur tempered a little with that of naphtha, not disagreeable. There are two kinds of this mummy; the one is valuable for its scarcity and great activity. The native place of the best mummy is far from the access of men, from habitations, and from springs of water, in the province of Daraab. It is found in a narrow cave, not above two fathoms deep, cut like a well out of the mass, at the foot of the ragged mountain Caucasus."—Kempfer. *Aman. Pers.*

This description agrees perfectly with the pissasphaltum or fossil mummy of Bua, differing only in the privation of smell, which it is difficult to imagine is totally wanting in the Persian mummy.

Pistil

P. n.

Pistachia nuts are moderately large, containing a kernel of a pale greenish colour, covered with a reddish skin. They have a pleasant, sweet, unctuous taste, resembling that of almonds; and they abound with a sweet and well-tasted oil, which they yield in great abundance on being pressed after bruising them: they are reckoned amongst the analeptics, and are wholesome and nutritive, and are by some esteemed very proper to be prescribed by way of restoratives, eaten in small quantity, to people emaciated by long illness.

PISTIL, among botanists, the little upright column which is generally found in the centre of every flower. According to the Linnæan system, it is the female part of generation, whose office is to receive and secrete the pollen, and produce the fruit. It consists of three parts, viz. germen, stylus, and stigma. See *BOTANY*, p. 324, and p. 454, 2d columns.

PISTOIA is a city of Italy, in the duchy of Tuscany, situated on the river Stella, in a beautiful plain near the foot of the Apennine mountains. By Pliny it is called *Pistorium*, and is said to have been once a Roman colony. At present it is a bishop's see, suffragan of Florence. The streets are broad and regular, the houses tolerably well built, but poorly inhabited for want of trade. Formerly it was an independent republic, but since it was subdued by the Florentines in 1200, it has been in a declining condition. The cathedral has a very handsome cupola, and a magnificent staircase to ascend to it. In the chapel dedicated to St James, where his relics are preserved, the walls are almost covered with plates of silver. Here are four marble statues of very good workmanship. The marble pulpit, the basso-relievos, the vessel that holds the holy water, and the square steeple, are the work of John Pisano. The Jesuits have a very fine college, and the Franciscans, Dominicans, and Augustinians, good churches. In the church of Madonna dell' Umiltà there are two statues, one of Leo X. and the other of Clement VII. The public palace, situated in a large square, is a handsome building; several of the nobility have also very good houses. In the neighbouring mountains, called by the name of Pistoia, there are many large villages, the chief of which is that of S. Marcello, belonging to the family of Cartoli. These mountains are a part of the Apennines, and border on the territory of Bologna and the county of Vernio; higher up is the source of the river Reno. The country about Pistoia, especially towards Florence, is exceeding fertile and delightful, covered with all sorts of fruits, corn, wine, &c. and containing a vast number of little towns, wealthy villages, and country seats, so as to be reckoned the richest and most beautiful in all Tuscany. It is about 20 miles N. W. of Florence, and 30 N. E. of Pisa. E. Long. 11. 29. N. Lat. 43. 55.

PISTOL, the smallest piece of fire-arms, borne at the saddle-bow, on the girdle, and in the pocket.

PISTOLE, a gold coin, struck in Spain and in several parts of Italy, Switzerland, &c.—The pistole has its augmentations and diminutions, which are quadruple pittoles, double pittoles, and half pittoles. See *MONEY-Table*.

PISTON, in pump-work, is a short cylinder of metal or other solid substance, fitted exactly to the cavity of the barrel or body of the pump. See *HYDROSTATICS*, sect. v.

PISTORIUS (John), born at Nidda in 1546, applied himself at first to the study of medicine, and was admitted a doctor with applause; but his prescriptions not being attended with all the success which he expected, he quitted that profession, and studied the law. His merit procured him the appointment of counsellor to Ernest Frederick margrave of Bade-Dourlach. He had embraced the Protestant religion; but some time after he changed his opinion, and returned to the communion of the church of Rome. He became afterwards a doctor of divinity, one of the emperor's counsellors, provost of the cathedral of Breslaw, and domestic prelate to the abbot of Fulda. We have of his writings, 1. *Several Controversial Tracts against the Lutherans*. 2. *Artis Cabalisticæ Scriptores*, printed at Bale 1587; a scarce and curious collection. 3. *Scriptores rerum Polonicarum*. 4. *Scriptores de rebus Germanicis*, in 3 vols. folio, from 1603 to 1613. This is a curious and scarce performance, but might have been better digested. The author died in 1608, at the age of 52.

PISUM, PEASE; a genus of the decandria order, belonging to the dialophia class of plants. The species are, 1. The sativum, or greater garden pea, whose lower stipulæ are roundish, indented, with taper foot-stalks, and many flowers on a foot-stalk. 2. The humile, or dwarf pea, with an erect branching stalk, and leaves having two pair of round lobes. 3. The umbellatum, rose, or crown pea, with four pointed acute stipuli, and foot-stalks bearing many flowers, which terminate the stalks. 4. The maritimum, or sea-pea, with foot-stalks which are plain on their upper side, an angular stalk, arrow-pointed stipulæ, and foot-stalks bearing many flowers. 5. The Americanum, commonly called *Cape-Horn pea*, with an angular trailing stalk, whose lower leaves are spear-shaped, sharply indented, and those at the top arrow-pointed. 6. The ochrus, with membranaceous running foot-stalks, having two leaves and one flower upon a foot-stalk.

There is a great variety of garden-pease now cultivated in Britain, which are distinguished by the gardeners and seedsmen, and have their different titles; but as great part of these have been seminal variations, so if they are not very carefully managed, by taking away all those plants which have a tendency to alter before the seeds are formed, they will degenerate into their original state: therefore all those persons who are curious in the choice of their seeds, look carefully over those which they design for seeds at the time when they begin to flower, and draw out all the plants which they dislike from the other. This is what they call *roguing their pease*; meaning hereby the taking out all the bad plants from the good, that the farina of the former may not impregnate the latter; to prevent which, they always do it before the flowers open. By thus diligently drawing out the bad, reserving those which come earliest to flower, they have greatly improved their pease of late years, and are constantly endeavouring to get forwarder varieties; so that it would be to little purpose in this place to attempt giving a particular account of all the varieties now cultivated: therefore we shall only mention the names by which they are commonly known, placing them according to their time of coming to the table, or gathering for use.

Pisum.

The golden hotspur. Nonpareil.
 The Charlton. Sugar dwarf.
 The Reading hotspur. Sickie pea.
 Master's hotspur. Marrowfat.
 Essex hotspur. Rose or crown pea.
 The dwarf pea. Rouncival pea.
 The suvar pea. Gray pea.
 Spanish Morotto. Pig pea; with some others.

The English sea-pea is found wild upon the shore in Suffex and several other counties in England, and is undoubtedly a different species from the common pea.

The fifth species hath a biennial root, which continues two years. This was brought from Cape Horn by Lord Anson's cook, when he passed that Cape, where these pease were a great relief to the sailors. It is kept here as a curiosity, but the pease are not so good for eating as the worst sort now cultivated in Britain. It is a low trailing plant; the leaves have two lobes on each foot-stalk: those below are spear-shaped, and sharply indented on their edges; but the upper leaves are small, and arrow pointed. The flowers are blue, each foot-stalk sustaining four or five flowers; the pods are taper, near three inches long; and the seeds are round, about the size of tares.

The sixth sort is annual. This grows naturally among the corn in Sicily and some parts of Italy, but is here preserved in botanic gardens for the sake of variety. It hath an angular stalk, rising near three feet high; the leaves stand upon winged foot-stalks, each sustaining two oblong lobes. The flowers are of a pale yellow colour, shaped like those of the other sort of pea, but are small, each foot-stalk sustaining one flower; these are succeeded by pods about two inches long, containing five or six roundish seeds, which are a little compressed on their sides. These are by some persons eaten green; but unless they are gathered very young, they are coarse, and at best not so good as the common pea. It may be sown and managed in the same way as the garden pea.

We shall now proceed to set down the method of cultivating the several sorts of garden pease, so as to continue them throughout the season.

It is a common practice with the gardeners near London to raise pease upon hot-beds, to have them very early in the spring; in order to which, they sow their pease upon warm borders, under walls or hedges, about the middle of October; and when the plants come up, they draw the earth up gently to their stems with a hoe, the better to protect them from frost. In these places they let them remain until the latter end of January, or the beginning of February, observing to earth them up from time to time as the plants advance in height (for the reasons before given); as also to cover them in very hard frost with pease-haulm, straw, or some other light covering, to preserve them from being destroyed; they then make a hot-bed (in proportion to the quantity of pease intended), which must be made of good hot dung, well prepared and properly mixed together, that the heat may not be too great. The dung should be laid for two or three feet thick, according as the beds are made earlier or later in the season; when the dung is equally levelled, then the earth (which should be light and fresh, but not over rich) must be laid thereon about six or eight inches thick, laying it equally all over the bed. This being done, the frames

Pisum.

(which should be two feet high on the back side, and about 14 inches in front) must be put on, and covered with glasses; after which it should remain three or four days, to let the steam of the bed pass off before you put the plants therein, observing every day to raise the glasses to give vent for the rising steam to pass off; then, when you find the bed of a moderate temperature for heat, you should, with a trowel, or some other instrument, take up the plants as carefully as possible to preserve the earth to their roots, and plant them into the hot-bed in rows about two feet asunder, and the plants about an inch distant from each other in the rows, observing to water and shade them until they have taken root; after which you must be careful to give them air at all times when the season is favourable, otherwise they will draw up very weak, and be subject to grow mouldy and decay. You should also draw the earth up to the shanks of the plants as they advance in height, and keep them always clear from weeds. The water they should have must be given them sparingly; for if they are too much watered, it will cause them to grow too rank, and sometimes rot off the plants at their shanks just above ground. When the weather is very hot, you should cover the glasses with mats in the heat of the day, to screen them from the violence of the heat of the sun, which is then too great for them: but when the plants begin to fruit, they should be watered oftener, and in greater plenty than before; for by that time the plants will have nearly done growing, and the often refreshing them will occasion their producing a greater plenty of fruit.

The sort of pea which is generally used for this purpose is the dwarf; for all the other sorts ramble too much to be kept in frames: the reason for sowing them in the common ground, and afterwards transplanting them on a hot-bed, is to check their growth, and cause them to bear in less compass; for if the seeds were sown upon a hot-bed, and the plants continued thereon, they would produce such luxuriant plants as could not be contained in the frames, and would bear but little fruit.

The next sort of pea which is sown to succeed those on the hot-bed is the hotspur; of which there are reckoned several varieties, as the golden hotspur, the Charlton hotspur, the Master's hotspur, the Reading hotspur, and some others; which are very little differing from each other, except in their early bearing, for which the golden and Charlton hotspurs are chiefly preferred; though if either of these sorts are cultivated in the same place for three or four years, they are apt to degenerate, and be later in fruiting; for which reason, most curious persons procure their seeds annually from some distant place; and in the choice of these seeds, if they could be obtained from a colder situation and a poorer soil than that in which they are to be sown, it will be much better than on the contrary, and they will come earlier in the spring.

These must also be sown on warm borders, towards the latter end of October; and when the plants are come up, you should draw the earth up to their shanks, and treat them in every other respect as above directed.

In the spring you must carefully clear them from weeds, and draw some fresh earth up to their stems; but do not raise it too high up to the plants, lest by

Pisum

burying their leaves you should rot their stems, as is sometimes the case, especially in wet seasons. You should also observe to keep them free from vermin, which, if permitted to remain amongst the plants, will increase so plentifully as to devour the greatest part of them. The chief of the vermin which infect pease are slugs, which lie all the day in the small hollows of the earth, near the stems of the plants, and in the night-time come out and make terrible destruction of the pease; and these chiefly abound in wet soils, or where a garden is neglected and over-run with weeds: therefore you should make the ground clear every way round the pease to destroy their harbours; and afterwards in a fine mild morning very early, when these vermin are got abroad from their holes, you should flake a quantity of lime, which should be strewed over the ground pretty thick, which will destroy the vermin wherever it happens to fall upon them, but will do very little injury to the pease, provided it be not scattered too thick upon them.

If this crop of pease succeeds, it will immediately follow those on the hot-bed; but for fear this should miscarry, it will be proper to sow two more crops at about a fortnight or three weeks distance from each other, so that there may be the more chances to succeed. This will be sufficient till the spring of the year, when you may sow several more crops of these pease at a fortnight distance from each other. The late sowings will be sufficient to continue the early sort of pease through the season; but it will be proper to have some of the large sort to succeed them for the use of the family: in order to which, you should sow some of the Spanish Morotto, which is a great bearer and a hardy sort of pea, about the middle of February, upon a clear open spot of ground. These must be sown in rows about four feet asunder, and the pease should be dropped in the drills about an inch distance, covering them about two inches deep with earth, being very careful that none of them lie uncovered, which will draw the mice, pigeons, or rooks, to attack the whole spot; and it often happens, by this neglect, that a whole plantation is devoured by these creatures; whereas, when there are none of the pease left in sight, they do not easily find them out.

About a fortnight after this you should sow another spot, either of this sort or any other large sort of pea, to succeed these; and then continue to repeat sowing once a fortnight, till the middle or latter end of May; only observing to allow the marrowfats, and other very large sorts of pease, at least four feet and a half between row and row; and the rose-pea should be allowed at least eight or ten inches distance plant from plant in the rows; for these grow very large, and if they have not room allowed them, they will spoil each other by drawing them up very tall, and will produce no fruit.

When the plants come up, the earth should be drawn up to their shanks (as was before directed), and the ground kept entirely clear from weeds; and when the plants are grown eight or ten inches high, you should stick some brushwood into the ground close to the pease for them to ramp upon, which will support them from trailing upon the ground, which is very apt to rot the growing sorts of pease, especially in wet seasons; besides, by thus supporting them, the air can freely pass between them, which will preserve the blossoms from

falling off before their time, and occasion them to bear much better than if permitted to lie upon the ground, and there will be room to pass between the rows to gather the pease when they are ripe.

The dwarf sorts of pease may be sown much closer together than those before-mentioned; for these seldom rise above a foot high, and rarely spread above half a foot in width, so that these need not have more room than two feet row from row, and not above an inch asunder in the rows. These will produce a good quantity of pease, provided the season be not over dry; but they seldom continue long in bearing, so that they are not so proper to sow for the main crop when a quantity of pease is expected for the table, their chief excellency being for hot-beds, where they will produce a greater quantity of pease (provided they are well-managed) than if exposed to the open air, where the heat of the sun soon dries them up.

The large growing sorts may be cultivated for the common use of the family, because these will produce in greater quantities than the other, and will endure the drought better; but the early kind are by far the sweeter-tasted pease.

The best of all the large kinds is the marrowfat, which, if gathered young, is a well-tasted pea; and this will continue good through the month of August, it planted on a strong soil.

The gray and other large winter-pease are seldom cultivated in gardens, because they require a great deal of room, but are usually sown in fields. For the proper method of managing them, see AGRICULTURE, n^o 150.

In the *Museum Rusticum*, Vol. I. p. 109. we find the following method of preparing pease for hog-meat, which we shall give in the words of the ingenious farmer who communicated it.

"A few years ago (says he), I had a plentiful crop of pease on a ten acre piece, which lies near my house: when they were full podded and nearly ripe, I had them hooked in the usual manner; but before I could get them in, there came a heavy shower of rain which wetted them through and through; and the dull heavy weather, with frequent showers which followed, prevented their drying for a considerable time.

"I caused the wads to be from time to time turned, to prevent the haulm from rotting; and at length a few days sunshine dried them enough to be inned; for as they lay hollow, the wind was greatly assitant to the operation.

"Before I got them in, on examining some of the pods, I found that the pease were all sprouted to a considerable length: this was what I had expected, as I gave my crop over for lost, till after a little recollection, as the weather still continued fine, I determined to thresh them in the field.

"This was accordingly done; and the corn, after it was cast and riddled to separate it from the rubbish, was dried on my malt kiln.

"When this operation was over, I began to reflect in what manner I should dispose of my pease, being sensible that they could not be proper for seed, and standing no chance of disposing of them to any advantage in the market.

"At length, as it was then a time of war, and of course there was a great demand for pork for the use of the navy, I determined to buy a considerable num-

Pisum.

Pisum.
Pit-coal.

ber of lean hogs, that I might by their means consume this crop on my own premises, and in that manner make the most of it.

"My expectations were more than answered; for I found, by repeated experience, that three bushels of the pease I have mentioned went nearly as far in fattening the hogs I bought as four bushels got in dry and hard in the manner usually practised.

"This discovery I made several years ago, and it has turned out to my advantage; for since that time I have been quite indifferent as to the weather in which my pease are sown, being rather better pleased, as far as relates to them, with wet than dry weather; but if the weather happens to be dry at the time they are ripe, I always cause as many as I want for feeding my hogs, which are not a few in a year, to be regularly malted in the same manner nearly as my barley: this management has of late succeeded very well with me, and I therefore intend to continue it.

"Besides feeding my hogs with these malted pease, I have often given them to my horses, with which they agree very well, and are heartening food.

"Turkeys will fatten apace on them also, and be fine meat.

"I have applied my malted pease to many other uses, which I have not at present time to enumerate: but were they only used for feeding hogs and horses, it is still worth while to prepare some in this manner every year."

PIT-COAL, or STONE-COAL. See COAL and LITHANTHRAX.

Mr Bertrand, in his *Oryctologic Dictionary*, reduces all kinds of coals to six general classes, viz. 1. Lithanthrax ligneus; 2. Petrosilus; 3. Terrestris; 4. Piceus; 5. Fissilis; 6. Mineralifatus. He says, that the Scots coals are heavier, and burn not so well as those of Newcastle; that those of Liege burn quicker; and those from Brassac in Auvergne, and from La Fosse, burn with a more agreeable flame, &c. But Mr Morand, in his *Nomenclature Raisonnée*, distributes all sorts of pit-coals into four classes: In the first he places nine varieties, beginning with the *gigas* or *succinum nigrum*, to the variegated lithanthrax; in the second he reckons seven varieties, beginning with the *lithanthrax elegantis structura*, to that *facie granulata*: and he forms the fourth class with the earthy and poorer kinds of fossil coals. He seems, however, to have been puzzled with the slaty coals, as he ranges them in a separate class, perhaps to shelter himself from the critical objections of those numerous superficial naturalists, who only look for the apparent configuration, without almost any regard to the component parts of fossils.

The coal-trade is of infinite importance to Great Britain, which never could have arrived at its present commercial eminence without it; and this eminence it will be impossible to retain if coal should ever become scarce. This we trust is not likely to be the case, though Mr Williams expresses great fears for it, and informs us that at Newcâble and in many parts of Scotland the mines near the sea are already wasted, the first consequence of which must be an enormous rise in the price. See his observations on this subject in his *Natural History of the Mineral Kingdom*, p. 156, &c. This author says, that coal was not discovered till between the middle of the 12th and beginning of the 13th centuries: it is therefore, according to him, 400 years since it was first

discovered in Britain, but they have not been in common use for more than 200 years. The same author gives us many pertinent observations on the appearances and indications of coal, instructions about searching for it, remarks on false and doubtful symptoms of coal; for all which, together with his observations on the different kinds of Scots coal, we shall refer our readers to the work itself; the first part of which, occupying the largest proportion of the first volume, is upon the *strata of coal*, and on the *concomitant strata*. See also our article COALERY.

PITAHAYA (*Castus Pitahaya*, Lin. *Syst. Vegetabilium*. Jacquin *Amer.* 151. ed. 2. p. 75. M. E. *Carthagena*), a shrub peculiar to California, is a kind of beech, the fruit of which forms the greatest harvest of the natives. Its branches are finely fluted, and rise vertically from the stem, so as to form a very beautiful top. The fruit is like a horse-chestnut. In some white, in others yellow, and in others red, but always exquisitely delicious, being a rich sweet, tempered with a grateful acid. See CACTUS.

PITCAIRNE (Dr Archibald), a most eminent physician and ingenious poet, was descended from the ancient family of the Pitcairnes of Pitcairne in Fife-shire, and was born at Edinburgh on the 25th of December 1652. He commenced his studies at the school of Dalkeith; and from thence he was removed to the university of Edinburgh, where he improved himself in classical learning, and completed a regular course of philosophy. His friends, according to the authors of the *Biographia Britannica*, were desirous that he should follow the profession of theology. The unpleasant gloom, however, which at that time hung over religion and its professors in Scotland, could not but very ill suit with that native cheerfulness of temper and liberality of mind which made him, long after, a mark for the arrows of preciseness and grimace. The law seems to have been his own choice, and to this science he turned his attention. With an ardour peculiar to himself, and an ambition to excel in whatever he undertook, he pursued it with so much intemperance, that his health began to be impaired. On this account, his physicians advised him to set out for the south of France. By the time he reached Paris, he was happily so far recovered, that he determined to renew his studies; but being informed that there was no able professor of law in that city, and finding several gentlemen of his acquaintance engaged in the study of physic, he went with them to the lectures and hospitals, and employed himself in this manner for several months till his affairs called him home.

On his return, he applied himself chiefly to the mathematics. It is not usual to see the briars of this science and the flowers of poetry growing in the same soil. Here, however, they were happily united; and to this union perhaps was owing that singular command of judgment, over one of the liveliest of fancies, which appears in every part of his works. His intimacy with Dr David Gregory, the celebrated mathematical professor, began about the same time; and probably conduced to cherish his natural aptitude for this study. It was then, in a great measure, new to him; it soon became his principal delight; his progress in it was rapid, and correspondent to his progress in other pursuits. His improvements on the method of infinite series then adopted, which Dr Wallis of Oxford after-

Pitahaya,
Pitcairne.

Pitcairne's words published, were a conspicuous and early proof of his abilities in this science.

Had Dr Pitcairne continued to prosecute the study of the law, and could he have moulded his principles to the times, the first offices and honours of the state might have been looked for without presumption as the probable reward of such talents as he possessed. Struck, however, with the charms of mathematical truth which had been lately introduced into the philosophy of medicine, and hoping to reduce the healing art to geometrical method, he unalterably determined on this less aspiring profession. At the period when he formed this resolution, the ideas of the medical world, already sufficiently confused, were still farther jumbled by the discovery of the circulation of the blood, which had as yet produced nothing but doubt, uncertainty, and astonishment. In Edinburgh at that time there was no school, no hospital, no opportunity of improvement but the chamber and the shop. He therefore soon after returned to Paris. Genius and industry are unhappily not often united in the same character: of such an union, however, Dr Pitcairne is a celebrated instance. During his residence in France, he cultivated the object of his pursuit with his natural enthusiasm, and with a steadiness from which he could not be diverted by the allurements of that joy which, in his hours of social and festive intercourse, he always felt and always gave. Among his various occupations, the study of the ancient physicians seems to have had a principal share. This appears from a treatise which he published some time after his return; and it shows, that he wisely determined to know the progress of medicine from its earliest periods, before he attempted to reform and improve that science.

On the 13th of August 1680, he received, from the faculty of Rheims the degree of Doctor; which, on the 7th of August 1699, was likewise conferred on him by the university of Aberdeen; both being attended with marks of peculiar distinction. Other medical honours are said to have been conferred on him in France and elsewhere; but nothing affords a more unequivocal testimony to his abilities than that which the surgeons of Edinburgh gave, in admitting him, freely and unsolicited, a member of their college. None had such opportunities of judging of his merit as a practitioner, and on no physician did they ever bestow the same public mark of respect. Soon after his graduation at Rheims, he returned to Edinburgh; where, on the 29th of November 1681, the Royal College of Physicians was instituted; and his name, among others, graced the original patent from the crown.

In his *Solutio Problematis de Inventoribus*, the treatise above alluded to, he discovers a wonderful degree of medical literature, and makes use of it in a manner that does great honour both to his head and his heart. His object is to vindicate Dr Harvey's claim to the discovery of the circulation of the blood. The discovery was, at first, controverted by envy, and reproved by ignorance. When at length its truth

was fully established, many invidiously attempted to tear the laurels from the illustrious Englishman, and to plant them on the brows of Hippocrates and others. Had the attempt been directed against himself, the generous soul of Pitcairne could not have exerted more zeal in a defence; and his arguments remain unanswered.

During his residence in Scotland, his reputation became so considerable, that, in the year 1691, the university of Leyden solicited him to fill the medical chair, at that time vacant. Such an honourable testimony of respect, from a foreign nation, and from such an university, cannot perhaps be produced in the medical biography of Great Britain. The lustre of such characters reflects honour on their profession, and on the country which has the good fortune of giving them birth; and serves to give the individuals of that country not only a useful estimation in their own eyes, but in those also of the rest of the world. Dr Pitcairne's well-known political principles excluded him from public honours and promotion at home: he therefore accepted the invitation from abroad; and, on the 26th of April 1692, delivered, at Leyden, his elegant and masterly inaugural oration: *Oratio qua ostenditur medicinam ab omni philosophorum secta esse liberam*. In this he clears medicine from the rubbish of the old philosophy; separates it from the influence of the different sects; places it on the broad and only sure foundation of experience; shows how little good inquiries into the manner how medicines operate have done to the art; and demonstrates the necessity of a sedulous attention to their effects, and to the various appearances of disease.

Nothing (says an elegant panegyrist* of our author) *Dr Charles Webster, in the *Harveian Oration* at Edinburgh for the year 1781; from which performance the present article is chiefly extracted. marks a superiority of intellect so much as the courage requisite to stem a torrent of obstinately prevailing and groundless opinions. For this the genius and talents of Pitcairne were admirably adapted; and, in his oration, he displays them to the utmost. It was received with the highest commendations; and the administrators, to testify their sense of such an acquisition to their university, greatly augmented the ordinary appointment of his chair.

He discharged the duties of his office at Leyden so as to answer the most sanguine expectations. He taught with a perspicuity and eloquence which met with universal applause. Independently of the encomiums of Boerhaave and Mead, who were his pupils, the numerous manuscript copies of his lectures, and the mutilated specimen of them† which found its way into the world without his knowledge, show how justly it was bestowed. At the same time, he was not more celebrated as a professor than as a practical physician; and notwithstanding the multiplicity of his business in both these characters, he found leisure to publish several treatises on the circulation, and some other of the most important parts of the animal economy (A).

At the close of the session he set out for Scotland, with an intention of returning in time for the succeeding one. On his marrying (B) the daughter of Sir Archibald

(A) Dr Boerhaave gives the following character of these and some other of Dr Pitcairne's dissertations, which were collected and published at Rotterdam, anno 1701: "Hæc scripta optima sunt et perfecta, five legas Dissertationem de Motu Sanguinis per Pulmones, five alia opuscula, five ultimum tractatum de Opio." *Methodus studii, ab Hallero edita*, p. 569.

(B) He had been married before to a daughter of Colonel James Hay of Pitfour, by whom he had a son and daughter, who both died young.

Pitcairne. Archibald Stevenson, the object of his journey, her relations would on no account consent to part with him again. He was therefore reluctantly obliged to remain; and he wrote the university a polite apology, which was received with the utmost regret. He even declined the most flattering solicitations and tempting offers to settle in London. Indeed he soon came into that extensive practice to which his abilities entitled him, and was also appointed titular professor of medicine in the university of Edinburgh.

The uniformity of a professional life is seldom interrupted by incidents worthy of record. Specimens, however, of that brilliant wit with which he delighted his friends in the hours of his leisure, continue to entertain us (c); and the effects of that eminent skill which he exerted in the cure of disease, still operate to the good of posterity.

The discovery of the circulation, while in some measure it exploded the chemical and Galenical doctrines, tended to introduce mathematical and mechanical reasoning in their stead. Of this theory (d) Dr Pitcairne was the principal support, and the first who introduced it into Britain. A mathematical turn of mind, and a wish for mathematical certainty in medicine, biased him in its favour, and he pushed it to its utmost extent. One is at a loss whether most to admire or regret such a waste of talents in propping a

theory which, though subversive of former ones, was **Pitcairne.** to fall before others but a little more satisfactory than itself. Mechanical physicians expected more from geometry than that science could grant. They made it the foundation instead of an auxiliary to their inquiries, and applied it to parts of nature not admitting mathematical calculations. By paying more attention afterwards to the supreme influence of the living principle, the source of all the motions and functions of the body, it was found that these could not be explained by any laws of chemistry or mechanism. They are still, however, involved in obscurity; and notwithstanding the numberless improvements which have taken place in the sciences connected with medicine, will perhaps remain inscrutable while man continues in his present stage of existence.

In a science so slowly progressive as that of medicine, Dr Pitcairne did a great deal. By labouring in vain for truth in one road, he saved many the same drudgery, and thereby showed the necessity of another. He not only exploded many false notions of the chemists and Galenists which prevailed in his time, but many of those too of his own sect. In particular, he showed the absurdity of referring all diseases and their cures to an alkali or an acid (e). He refuted the idea of secretion being performed by pores differently shaped (f), Bellini's opinion of effluences in the

(c) Vide *Pitcairni Poemata*.—Several of his poems, however, are obscure, and some of them totally unintelligible without a key. In those of them which are of a political kind, he wished not to express himself too clearly; and in others, he alludes to private occurrences which were not known beyond the circle of his companions. His poem (*Ad Lindesum*), addressed to his friend Lindsey, is commented on by the authors of the *Biographia Britannica*; and it is to be regretted that it is the only one on which they have been solicitous to throw light. "Some parts (say they) of this poem, are hardly intelligible, without knowing a circumstance in the Doctor's life, which he often told, and never without some emotion. It is a well known story of the two Platonic philosophers, who promised one another, that whichever died first should make a visit to his surviving companion. This story being read by Mr Lindsey and our author together, they, being both then very young, entered into the same engagement. Soon after, Pitcairne, at his father's house in Fife, dreamed one morning that Lindsey, who was then at Paris, came to him, and told him he was not dead, as was commonly reported, but still alive, and lived in a very agreeable place, to which he could not yet carry him. By the course of the post news came of Lindsey's death, which happened very suddenly the morning of the dream. When this is known, the poem is easily understood, and shines with no common degree of beauty.

"Lyndesi! Stygiâs jamdudum vecte per undas,
 "Stagnaue Cocyti non adeunda mihi;
 "Excute paulisper Lethæi vincula somni,
 "Ut feriant animum carmina nostra tuum.
 "Te nobis, te redde tuis, promissa daturus
 "Gaudia; sed proavo sis comitante redux:
 "Namque novos viros mutataque regna videbis,
 "Passaque Teutonicas sceptrâ Britannia manus*.

"He then proceeds to exclaim against the principles and practices which produced this Teutonic violence upon the British sceptre; and concludes with a wish, that Lindsey might bring Rhadamanthus with him to punish them.

"Unus abest scelerum vindex Rhadamanthus; amice,
 "Dii faciant reditus sit comes ille tui!

"Every one sees how much keener an edge is given to the satire upon the revolution, by making it an additional reason for his friend's keeping his promise to return him a visit after his death."

(d) See the article *PHYSIOLOGY*, n° 7—14.

(e) *Pitcairni Dissertationes*, Edin. edit. 1713. De opera quam præstant corpora acida vel alkalica in curatione morborum.

(f) De circulatione sanguinis per vasa minima.

* Written
 in 1689.

Pitcairne.

the animal spirits with the blood, and Borelli's of air entering the blood by respiration (g). He proved the continuity of the arteries and veins (h); and seems to have been the first who showed that the blood flows from a smaller capacity into a larger; that the aorta, with respect to the arterial system, is the apex of a cone (i). In this therefore he may be considered as the latent spring of the discoveries respecting the powers moving the blood. He introduced a simplicity of prescription unknown in pharmacy before his time (k); and such was the state of medicine in this country, that scarcely have the works of any contemporary or preceding author been thought worthy even of preservation (l). As to the errors of his philosophy, let it be remembered, that no theory has as yet stood the test of many years in an enlightened period. His own hung very loosely about him (m); and the present generally received practice differs from his very little in reality. He treated inflammatory and hemorrhagic diseases by bleeding, purging, and blistering, as has been done uniformly and solely on the different theories since. His method of administering mercury and the bark is observed at this day; and with respect to febrile, nervous, glandular, and dropical affections, they seem to be as often the opprobriums of the art now as they were then.

Dr Pitcairne was universally considered as the first physician of his time. No one appears ever to have had so much practice in this country, or so many consultations from abroad; and no one, from all accounts, ever practised with greater sagacity and success. The highest thought themselves honoured by his acquaintance, and the lowest were never denied his assistance and advice. The emoluments of his profession must have been great; but his charities are known to have been correspondent. The possession of money he postponed to more liberal objects: he collected one of the finest private libraries in the world; which was purchased, after his death, by the Czar of Muscovy. Notwithstanding the fatigues he underwent in the exercise of his profession, his constitution was naturally delicate. About the beginning of October 1713, he became affected with his last illness; and on the 23d he died, regretted by science as its ornament, by his country as its boast, and by humanity as its friend. He left a son and four daughters: of whom only one of the latter now survives. The present noble family of Kelly are his grandchildren.

Some anonymous publications are attributed to Dr Pitcairne, particularly a treatise *De Legibus Historiæ Naturalis*, &c.; but the only ones he thought proper to legitimate are his *Dissertationes Medicæ*, and a short essay *De Salute*.

PITCAITHLY. See PITKEATHLY.

PITCH, a tenacious oily substance, drawn chiefly from pines and firs, and used in shipping, medicine, and various arts: or it is more properly tar inspissated by boiling it over a slow fire. See TAR.

Fossil PITCH. See PETROLEUM.

PITCHING, in sea-affairs, may be defined the vertical vibration which the length of a ship makes about her centre of gravity; or the movement by which she plunges her head and after-part alternately into the hollow of the sea. This motion may proceed from two causes: the waves which agitate the vessel; and the wind upon the sails, which makes her stoop to every blast thereof. The first absolutely depends upon the agitation of the sea, and is not susceptible of inquiry; and the second is occasioned by the inclination of the masts, and may be submitted to certain established maxims.

When the wind acts upon the sails, the mast yields to its effort, with an inclination which increases in proportion to the length of the mast, to the augmentation of the wind, and to the comparative weight and distribution of the ship's lading.

The repulsion of the water, to the effort of gravity, opposes itself to this inclination, or at least sustains it, by as much as the repulsion exceeds the momentum, or absolute effort of the mast, upon which the wind operates. At the end of each blast, when the wind suspends its action, this repulsion lifts the vessel; and these successive inclinations and repulsions produce the movement of pitching, which is very inconvenient; and, when it is considerable, will greatly retard the course, as well as endanger the mast, and strain the vessel.

PITH, in vegetation, the soft spongy substance contained in the central parts of plants and trees *. * See Plants.

PITHO, (fab. hist.) the goddess of persuasion among the Romans. She was supposed to be the daughter of Mercury and Venus, and was represented with a diadem on her head, to intimate her influence over the hearts of man. One of her arms appeared raised as in the attitude of an orator haranguing in a public assembly; and with the other she holds a thunderbolt and fetters, made with flowers, to signify the powers of reasoning and the attractions of eloquence. A caduceus, as a symbol of persuasion, appears at her feet, with the writings of Demosthenes and Cicero, the two most celebrated among the ancients, who understood how to command the attention of their audience, and to rouse and animate their various passions.—A Roman courtesan. She received this name on account of the allurements which her charms possessed, and of her winning expressions.

PITHOM,

(g) De diversa mole qua sanguis fluit per pulmones.

(h) De circulatione sanguinis per vasa minima.

(i) De circulatione sanguinis in animalibus genitis et non genitis.

(k) *Elementa Medicinæ*, lib. i. cap. 21. et passim.(l) The first medical publication which distinguished this country, after Dr Pitcairne's, was that of the *Edinburgh Medical Essays*, in the year 1732. Vid. the article MONRO.(m) Patet (*says he*) medicinam esse memoriam eorum quæ cuilibet morbo usus ostendit fuisse utilia. Nam notas non esse corporum intra venas fluentium aut consistentium naturas, adeoque sola observatione innotescere quæ cuique morbo conveniat, postquam sæpius eadem eidem morbo profuisse comperimus. *De Div. Morb.*

Pithom,
Pithon.

PITHOM, one of the cities that the children of Israel built for Pharaoh in Egypt (Exod. i. 11.) during the time of their servitude. This is probably the same city with Pithum^{os} mentioned by Herodotus, which he places upon the canal made by the kings Necho and Darius to join the Red sea with the Nile, and by that means with the Mediterranean. We find also in the ancient geographers, that there was an arm of the Nile called *Putheticus*, *Phatmicus*, *Phatnicus*, or *Phatniticus*. Bochart says, that Pithom and Raamses are about five leagues above the division of the Nile, and beyond this river: but this assertion has no proof from antiquity. This author contents himself with relating what was said of Egypt in his own time. Marsham will have Pithom to be the same as Pelusium or Damietta.

PITHOU or PITHOËUS (Peter), a Frenchman of great literary eminence, was descended from an ancient and noble family in Normandy, and born at Troyes in 1539. His taste for literature appeared very early, and his father cultivated it to the utmost. He first studied at Troyes, and was afterwards sent to Paris, where he became first the scholar, and then the friend, of Turnebus. Having finished his pursuits in languages and the belles lettres, he was removed to Bourges, and placed under Cujacius in order to study civil law. His father was well skilled in this profession, and has left no inconsiderable specimen of his judgment in the advice he gave his son with regard to acquiring a knowledge of it; which was, not to spend his time and pains upon voluminous and barren commentators, but to confine his reading chiefly to original writers. He made so rapid a progress, that at seventeen he was able to speak extempore upon the most difficult questions; and his master was not ashamed to own, that even himself had learned some things of him. Cujacius afterwards removed to Valence; and Pithœus followed him, and continued to profit by his lectures till the year 1560. He then returned to Paris, and frequented the bar of the parliament there, in order to join practical forms and usages to his theoretic knowledge.

In 1563, being then 24, he published *Adversaria Subiecta*, a work highly applauded by Turnebus, Lipsius, and other learned men; and which laid the foundation of that great and extensive fame he afterwards acquired. Soon after this, Henry III. advanced him to some considerable posts; in which, as well as at the bar, he acquitted himself most honourably. Pithœus being a Protestant, it was next to a miracle that he was not involved in the terrible massacre of St Bartholomew in 1572; for he was at Paris where it was committed, and in the same lodgings with several Huguenots, who were all killed. It seems indeed to have frightened him out of his religion; which having, according to the custom of converts, examined and found to be erroneous, he soon abjured, and openly embraced the Catholic faith. He afterwards attended the duke of Montmorency into England; and on his return, from his great wisdom, good nature, and amiable manners, he became a kind of oracle to his countrymen, and even to foreigners, who consulted him on all important occasions: an instance of which we have in Ferdinand the Grand Duke of Tuscany, who not only consulted him, but even submitted to his determination in a point contrary to his interests. Hen-

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ry III. and IV. were greatly obliged to him for combating the League in the most intrepid manner, and for many other services, in which he had recourse to his pen as well as to other means.

Pithœus died upon his birth-day in 1596, leaving behind him a wife whom he had married in 1579, and 1 some children. Thuanus says he was the most excellent and accomplished man of the age in which he lived; and all the learned have agreed to speak well of him. He collected a very valuable library, containing a variety of rare manuscripts, as well as printed books; and he took many precautions to hinder its being dispersed after his death, but in vain. He published a great number of works upon law, history, and classical literature; and he gave several new and correct editions of ancient writers. He was the first who made the world acquainted with the Fables of Phædrus: which, together with the name of their author, were utterly unknown and unheard of, till published from a manuscript of his.

PITISCUS (Samuel), a learned antiquary, born at Zutphen, was rector of the college of that city, and afterwards of St Jerome at Utrecht, where he died on the first of February 1717, aged 90. He wrote, 1. *Lexicon Antiquitatum Romanorum*, in two volumes folio; a work which is esteemed. 2. Editions of many Latin authors, with notes; and other works.

PITKEATHLY, or PITCAITHLY, is the name of an estate in Strathern in Scotland, famous for a mineral spring. An intelligent traveller * gives the following account of it. "The situation of the mineral spring at Pitcaithly, the efficacy with which its waters are said to operate in the cure of the diseases for which they are used, and the accommodations which the neighbourhood affords, are all of a nature to invite equally the sick and the healthy. Two or three houses are kept in the style of hotels for the reception of strangers. There is no long-room at the well; but there are pleasing walks through the adjoining fields. Good roads afford easy access to all the circumjacent country. This delightful tract of Lower Strathern is filled with houses and gardens, and situations from which wide and delightful prospects may be enjoyed; all of which offer agreeable points to which the company at the well may direct their forenoon excursions; conversation, music, dances, whist, and that best friend to elegant, lively, and social converse, the tea-table, are sufficient to prevent the afternoons from becoming languid; and in the evenings nothing can be so delightful as a walk when the setting sun sheds a soft glowing light, and the dew has just not begun to moisten the grass.—This is Pitcaithly truly a rural watering place. The company cannot be at any one time more in number than two or three families. The amusements of the place are simply such as a single family might enjoy in an agreeable situation in the country; only the society is more diversified by the continual change and fluctuation of the company." See *Mineral Waters*, p. 52.

PITOT (Henry), of a noble family in Languedoc, was born at Aramont in the diocese of Uzès, on the 20th of May 1695, and died there on the 27th of December 1771, aged 76. He learned the mathematics without a master, and went to Paris in 1718, where he formed a close friendship with the illustrious

Pitœus
||
Pitot.

Pitot.
Pits.

Reaumur. In 1724, he was admitted a member of the Royal Academy of Sciences at Paris, and in a few years rose to the degree of a pensioner. Besides a vast number of Memoirs printed in the collection of that society, he published in 1731 the Theory of the Working of Steam, in one volume 4to; a work of considerable merit, which was translated into English, and made the author be admitted into the Royal Society of London. In 1742, the states-general of Languedoc made choice of him for their chief engineer, and gave him at the same time the appointment of inspector-general of the canal which unites the two seas. That province is indebted to him for several monuments of his genius, which will transmit his name with lustre to posterity. The city of Montpellier being in want of water, Pitot brought from the distance of three leagues two springs which furnish a plentiful supply of that necessary article. They are brought to the magnificent Place du Peyron, and thence are distributed through the city. This astonishing work is the admiration of all strangers. The illustrious marshal de Saxe was the great patron and friend of Pitot, who had taught this hero the mathematics. In 1754 he was honoured with the order of St Michael. In 1735 he had married Maria-Leonina Pharamibier de Sballoua, descended of a very ancient noble family of Navarre. By this marriage he had only one son, who was first advocate-general of the Court of Accounts, Aids, and Finances of Montpellier. Pitot was a practical philosopher, and a man of uncommon probity and candour. He was also a member of the Royal Society of Sciences of Montpellier; and his eulogium was pronounced in 1772 by M. de Ratte perpetual secretary, in presence of the states of Languedoc; as it likewise was at the Royal Academy of Sciences of Paris by Abbé de Fouchi, who was then secretary.

PITS (John), the biographer, was born in 1560, at Aulton in Hampshire, and educated at Wykeham's school near Winchester, till he was about 18 years of age; when he was sent to New-college in Oxford, and admitted probationer fellow. Having continued in that university not quite two years, he left the kingdom as a voluntary Romish exile, and retired to Douay; thence he went to the English college at Rheims, where he remained about a year; and then proceeded to Rome, where he continued a member of the English college near seven years, and was made a priest. In 1589 he returned to Rheims; and there, during two years, taught rhetoric and the Greek language. He now quitted Rheims on account of the civil war in France; and retired to Pont à Mousson in Lorraine, where he took the degrees of master of arts and bachelor in divinity. Hence he travelled into Germany, and resided a year and a half at Triers, where he commenced licentiate in his faculty. From Triers he visited several of the principal cities in Germany; and continuing three years at Ingoldstadt in Bavaria, took the degree of doctor in divinity. Thence having made the tour of Italy, he returned once more to Lorraine; where he was patronised by the cardinal of that duchy, who preferred him to a canonry of Verdun; and about two years after he became confessor to the duchess of Cleves, daughter to the duke of Lorraine. During the leisure he enjoyed in this employment, he wrote in Latin the lives of the kings,

Pitt.

bishops, apostolical men, and writers of England. The last of these, commonly known and quoted by this title, *De illustribus Angliæ scriptoribus*, was published after his death. The three first remain still in manuscript among the archives of the collegiate church of Liverdun. The duke of Cleves dying after Pitts had been about twelve years confessor to the duchess, she returned to Lorraine, attended by our author, who was promoted to the deanery of Liverdun, which, with a canonry and officialship, he enjoyed to the end of his life. He died in 1616, and was buried in the collegiate church. Pitts was undoubtedly a scholar, and not an inelegant writer; but he is justly accused of ingratitude to Bale, from whom he borrowed his materials, without acknowledgment. He quotes Leland with great familiarity, without ever having seen his book: his errors are innumerable, and his partiality to the Romish writers most obvious; nevertheless we are obliged to him for his account of several popish authors, who lived abroad at the beginning of the Reformation.

PITT (Christopher), an eminent English poet, celebrated for his excellent translation of Virgil's *Æneid*, was born in the year 1699. Having studied four years at New-college, Oxford, he was presented to the living of Pimperne in Dorsetshire, which he held during the remainder of his life. He had so poetical a turn, that while he was a school-boy he wrote two large folios of manuscript poems, one of which contained an entire translation of Lucan. He was much esteemed while at the university; particularly by the celebrated Dr Young, who used familiarly to call him his *son*. Next to his fine translation of Virgil, Mr Pitt gained the greatest reputation by his excellent English translation of Vida's art of poetry. This amiable poet died in the year 1648, without leaving, it is said, one enemy behind him.

PITT (William) earl of Chatham, a most celebrated British statesman and patriot, was born in November 1708. He was the youngest son of Robert Pitt, Esq; of Boconnock in Cornwall; and grandson of Thomas Pitt, Esq; governor of Fort St George in the East Indies, in the reign of queen Anne, who sold an extraordinary fine diamond to the king of France for 135,000*l*. and thus obtained the name of *Diamond Pitt*. His intellectual faculties and powers of elocution very soon made a distinguished appearance; but at the age of 16 he felt the attacks of an hereditary and incurable gout, by which he was tormented at times during the rest of his life.

His lordship entered early into the army, and served in a regiment of dragoons. Through the interest of the duchess of Marlborough he obtained a seat in parliament before he was 21 years of age. His first appearance in the house was as representative of the borough of Old Sarum, in the ninth parliament of Great Britain. In the 10th he represented Seaford, Aldborough in the 11th, and the city of Bath in the 12th; where he continued till he was called up to the house of peers in 1766. The intention of the duchess in bringing him thus early into parliament was to oppose Sir Robert Walpole, whom he kept in awe by the force of his eloquence. At her death the duchess left him 10,000*l*. on condition, as was then reported, that he never should receive a place in administration.

Pitt.

Pitt.

However, if any such condition was made, it certainly was not kept on his Lordship's part. In 1746 he was appointed vice-treasurer of Ireland, and soon after paymaster general of the forces, and sworn a privy-counsellor. He discharged the office of paymaster with such honour and inflexible integrity, refusing even many of the perquisites of his office, that his bitterest enemies could lay nothing to his charge, and he soon became the darling of the people. In 1755 he resigned the office of paymaster, on seeing Mr Fox preferred to him. The people were alarmed at this resignation; and being disgusted with the unsuccessful beginning of the war, complained so loudly, that, on the 4th December 1756, Mr Pitt was appointed secretary of state in the room of Mr Fox afterwards Lord Holland; and other promotions were made in order to second his plans. He then took such measures as were necessary for the honour and interest of the nation; but in the month of February 1757, having refused to assent to the carrying on a war in Germany for the sake of his majesty's dominions on the continent, he was deprived of the seals on the 5th of April following. Upon this the complaints of the people again became so violent, that on the 29th of June he was again appointed secretary, and his friends filled other important offices. The success with which the war was now conducted is universally known; yet on the 5th of October 1761, Mr Pitt, to the astonishment of almost the whole kingdom, resigned the seals into his majesty's own hands. The reason of this was, that Mr Pitt, having received certain intelligence that the family compact was signed between France and Spain, and that the latter was about to join France against us, thought it necessary to prevent her by commencing hostilities first. Having communicated this opinion in the privy council, the other ministers urged that they would think twice before they declared war against that kingdom. "I will not give them leave to think (replied Mr Pitt); this is the time, let us crush the whole house of Bourbon. But if the members of this board are of a different opinion, this is the last time I shall ever mix in its councils. I was called into the ministry by the voice of the people, and to them I hold myself answerable for my conduct. I am to thank the ministers of the late king for their support; I have served my country with success; but I will not be responsible for the conduct of the war any longer than while I have the direction of it." To this bold declaration, the lord who then presided in council made the following reply. "I find the gentleman is determined to leave us; nor can I say that I am sorry for it, since he would otherwise have certainly compelled us to leave him. But if he is resolved to assume the right of advising his majesty, and directing the operations of the war, to what purpose are we called to this council? When he talks of being responsible to the people, he talks the language of the house of commons, and forgets that at this board he is responsible only to the king. However, though he may possibly have convinced much of his inability, that it remains that we should be equally convinced before we can resign our understandings to his direction, or join with him in the measure he proposes."

This conversation, which was followed by Mr Pitt's resignation, is sufficient to show the haughtiness and

imperious temper of our minister. However, these very qualities were sometimes productive of great and good consequences, as appears from the following anecdote. — Preparatory to one of the secret expeditions during the war which ended in 1763 the minister had given orders to the different presiding officers in the military, navy, and ordnance departments, to prepare a large body of forces, a certain number of ships, and a proportionable quantity of stores, &c. and to have them all ready against a certain day. To these orders he received an answer from each of the officers, declaring the total impossibility of a compliance with them. Notwithstanding it was then at a very late hour, he sent immediately for his secretary; and after expressing his resentment at the ignorance or negligence of his majesty's servants, he gave the following commands: — "I desire, Mr Wood, that you will immediately go to Lord Anson; you need not trouble yourself to search the admiralty, he is not to be found there; you must pursue him to the gaming house, and tell him from me, that if he does not obey the orders of government which he has received at my hands, that I will most assuredly impeach him. Proceed from him to Lord Ligonier; and though he should be bolstered with harlots, undraw his curtains, and repeat the same message. Then direct your course to Sir Charles Frederick, and assure him, that if his majesty's orders are not obeyed, they shall be the last which he shall receive from me." In consequence of these commands, Mr Wood proceeded to White's, and told his errand to the first lord of the admiralty; who insisted that the secretary of state was out of his senses, and it was impossible to comply with his wishes: "however, (added he), as madmen must be answered, tell him that I will do my utmost to satisfy him." From thence he went to the commander in chief of the forces, and delivered the same message. He also said that it was an impossible business; "and the secretary knows it, (added the old lord): nevertheless, he is in the right to make us do what we can; and what is possible to do, inform him, shall be done." The surveyor general of the ordnance was next informed of Mr Pitt's resolution; and, after some little consideration, he began to think that the orders might be completed within the time prescribed. The consequence at last was, that every thing, in spite of impossibilities themselves, was ready at the time appointed.

After his resignation in 1761, Mr Pitt never had any share in administration. He received a pension of 3000*l.* a-year, to be continued after his decease, during the survivancy of his lady and son; and this gratuity was dignified with the title of *Baroness of Chatham* to his lady, and that of *Baron* to her heirs male. Mr Pitt at that time declined a title of nobility; but in 1766 accepted of a peerage under the title of *Baron Pitt Rivers and Earl of Chatham*, and at the same time he was appointed lord privy-seal.

This acceptance of a peerage proved very prejudicial to his lordship's character. However, he continued steadfast in his opposition to the measures of administration. His last appearance in the House of Lords was on the 2d of April 1778. He was then very ill and much debilitated: but the question was important, being a motion of the duke of Richmond to address his majesty to remove the ministers, and make peace with America on any terms. His lord-

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ship made a long speech, which had certainly overcome his spirits: for, attempting to rise a second time, he fell down in a convulsive fit; and though he recovered for that time, his disorder continued to increase till the 11th of May, when he died at his seat at Hayes. His death was lamented as a national loss. As soon as the news reached the House of Commons, which was then sitting, Colonel Barré made a motion, that an address should be presented to his majesty, requesting that the Earl of Chatham should be buried at the public expence. But Mr Rigby having proposed the erecting of a statue to his memory, as more likely to perpetuate the sense of his great merits entertained by the public, this was unanimously carried. A bill was soon after passed, by which 4000*l.* a-year was settled upon John, now earl of Chatham, and the heirs of the late earl to whom that title may descend.—His lordship was married in 1754 to Lady Hester, sister to the earl of Temple; by whom he had three sons and two daughters.

Never perhaps was any life so multifarious as that of Lord Chatham; never did any comprise such a number of interesting situations. To bring the scattered features of such a character into one point of view, is an arduous task. The author of the history of his life * has attempted to do it; and with the outlines of what he has said in summing up his character, we shall finish our biographical sketch of this wonderful man.

* *History of the Life of William Pitt, Earl of Chatham.*

“ One of the first things that strikes us, in the recollection of Chatham’s life, is the superior figure he makes among his contemporaries. Men of genius and attraction, a Carteret, a Townshend, and I had almost said a Mansfield, however pleasing in a limited view, appear evidently in this comparison to shrink into narrower dimensions, and walk a humbler circle. All that deserves to arrest the attention, in taking a general survey of the age in which he lived, is comprised in the history of Chatham. No character ever bore the more undisputed stamp of originality. Unresembled and himself, he was not born to accommodate to the genius of his age. While all around him were depressed by the uniformity of fashion, or the contagion of venality, he stood aloof. He consulted no judgment but his own; and he acted from the untainted dictates of a comprehensive soul.

“ The native royalty of his mind is eminently conspicuous. He felt himself born to command; and the free sons of Britain implicitly obeyed him. In him was realised the fable of Orpheus; and his genius, his spirit, his eloquence, led millions in his train, subdued the rugged savage, and disarmed the fangs of malignity and envy. Nothing is in its nature so inconsistent as the breath of popular applause: and yet that breath was eminently his during the greater part of his life. Want of success could not divert it; inconsistency of conduct could not change its tenor. The astonishing extent of his views, and the mysterious comprehension of his plans, did not in one respect set him above little things: nothing that was necessary to the execution of his designs was beneath him. In another respect, however, he was infinitely estranged to little things: swallowed up in the business of his country, he did not think of the derangement of his own private affairs; for, though indisposed to all the modes of dissipated expence, his affairs, even when his circumstances were

much improved, were always deranged. But the features that seem most eminently to have characterised him, were spirit and intrepidity: they are conspicuous in every action and in every turn of his life; nor did this spirit and intrepidity leave him even at the last.

“ The manners of lord Chatham were easy and bland, his conversation was spirited and gay, and he readily adapted himself to the complexion of those with whom he associated. That artificial reserve, which is the never-failing refuge of self-diffidence and cowardice, was not made for him. He was unconstrained as artless infancy, and generous as the noon-day sun: yet had he something impenetrable that hung about him. By an irresistible energy of soul, he was haughty and imperious. He was incapable of associating councils, and he was not formed for the sweetest bands of society. He was a pleasing companion, but an unpliant friend.

“ The ambition of our hero, however generous in its strain, was the source of repeated errors in his conduct. To the resignation of lord Carteret, and again, from the commencement of the year 1770, his proceedings were bold and uniform. In the intermediate period they were marked with a veratility, incident only in general to the most flexible minds. We may occasionally trace in them the indecision of a candidate, and the suppleness of a courtier. In a word, he aimed at the impossible task of flattering at once the prejudices of a monarch, and pursuing unremittedly the interests of the people.

“ A feature, too, sufficiently prominent in his character, was vanity, or perhaps pride and conscious superiority. He dealt surely somewhat too freely with invective. He did not pretend to an ignorance of his talents, or to manage the display of his important services. Himself was too often the hero of his tale; and the successes of the last war the burden of his long *†* Ending in 1763.

“ Patriotism was also the source of some of his imperfections. He loved his country too well; or, if that may sound absurd, the benevolence at least, that embraces the species, had not sufficient scope in his mind. He once styled himself a *lover of honourable war*; and in so doing he let us into one trait of his character. The friend of human kind will be an enemy to all war. He indulged too much a puerile antipathy to the house of Bourbon: and it was surely the want of expansive affections that led him to so unqualified a condemnation of American independency.

“ But the eloquence of lord Chatham was one of his most striking characteristics. He far outstripped his competitors, and stood alone the rival or antiquity.

“ His eloquence was of every kind. No man excelled him in close argument and methodical deduction: but this was not the style into which he naturally fell. His oratory was unlaboured and spontaneous: he rushed at once upon the subject; and usually illustrated it rather by glowing language and original conception, than by cool reasoning. His person was tall and dignified; his face was the face of an eagle; his piercing eye withered the nerves, and looked through the souls of his opponents; his countenance was stern, and the voice of thunder sat upon his lips: anon, however, he could descend to the easy and the playful. His voice seemed scarcely more adapted to energy and to terror, than

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Pittacus. than it did to the melodious, the insinuating, and the sportive. If, however, in the enthusiasm of admiration, we can find room for the frigidity of criticism, his action seemed the most open to objection. It was forcible, uniform, and ungraceful. In a word, the most celebrated orators of antiquity were in a great measure the children of labour and cultivation. Lord Chatham was always natural and himself."

To the misfortune of the republic of letters, and of posterity, his lordship never fought the press. Lord Chesterfield says, "that he had a most happy turn for poetry: but it is more than probable that Chesterfield was deceived; for we are told by his biographer that his verses to Garrick were very meagre, and lord Chatham himself said that he seldom indulged and seldom avowed it. It should seem, then, that he himself set no great value upon it. Perhaps a proper confidence of one's self is essential to all extraordinary merit. Why should we ambitiously ascribe to one mind every species of human excellence? But though he was no poet, it is more than probable, that he would have excelled as much in writing prose as he did in speaking it.

PITTACUS, a native of Mitylene in Lesbos, was one of the seven wise men of Greece: his father's name was Hyrradius. With the assistance of the sons of Alcæus, he delivered his country from the oppression of the tyrant Melanchrus; and in the war which the Athenians waged against Lesbos, he appeared at the head of his countrymen, and challenged to single combat Phrynon the enemy's general. As the event of the war seemed to depend upon this combat, Pittacus had recourse to artifice; and when he engaged, he entangled his adversary in a net which he had concealed under his shield, and easily dispatched him. He was amply rewarded for this victory; and his countrymen, sensible of his merit, unanimously appointed him governor of their city with unlimited authority. In this capacity Pittacus behaved with great moderation and prudence; and after he had governed his fellow-citizens with the strictest justice, and after he had established and enforced the most salutary laws, he voluntarily resigned the sovereign power after having enjoyed it for 10 years, observing that the virtues and innocence of private life were incompatible with the power and influence of a sovereign. His disinterestedness gained him many admirers; and when the Mityleneans wished to reward his public services by presenting him with an immense tract of territory, he refused to accept more land than what should be contained in the distance to which he could throw a javelin. He died in the 70th year of his age, about 579 years before Christ, after he had spent the last 10 years of his life in literary ease and peaceful retirement.

The following maxims and precepts are ascribed to Pittacus: The first office of prudence is to foresee threatening misfortunes, and prevent them. Power discovers the man. Never talk of your schemes before they are executed; lest, if you fail to accomplish them, you be exposed to the double mortification of disappointment and ridicule. Whatever you do, do it well. Do not that to your neighbour which you would take ill from him. Be watchful for opportunities.

Many of his maxims were inscribed on the walls of Apollo's temple at Delphi, to show to the world how

great an opinion the Mityleneans entertained of his abilities as a philosopher, a moralist, and a man. By one of his laws, every fault committed by a man when intoxicated deserved double punishment.

PITTENWEEM, a small town situated on the Frith of Forth, towards the eastern extremity of the county of Fife in North Britain. It takes its name from a small cave in the middle of it anciently called a *weem*, and is remarkable for nothing but the ruins of a religious house, which is sometimes called an *abbey* and sometimes a *priory*. Which of these is the proper denomination it is hardly worth while to inquire; but it appears from the arms of the monastery, still preserved over the principal gate, that the superior, by whatever title he was called, had the privilege of wearing a mitre. This edifice, which seems never to have been large, was, with other monuments of mistaken piety, alienated from the church at the Reformation; and what parts of it now remain are put to very different uses. Some of the cells of the monks furnish habitations tolerably convenient for the servants of him who, in the ceaseless change of property, has got possession of the lands which formerly belonged to them. That which seems to have been the granary is a decent parish church. The porch of the chapel, the only part of that building which exists, has been alternately employed as a stable and a slaughter-house; and the meat killed there has been commonly exposed to sale in the lower part of the steeple of that edifice which is now dedicated to the offices of parochial devotion. Had the moralizing traveller*, who composed the beautiful and pathetic meditation on the ruins of *Iona*, condescended to visit Pittenweem, he would not have viewed the abbey without emotion. Insignificant as the place at present is, it seems to have been of some consequence in the last century; and we are led to infer, from the following extract from the records, that the inhabitants were opulent, and that the town was fortified.

"Pittenweem, decimo quarto Feb. 1651. The bailies and council being convened, and having received information that his majesty is to be in progress with his court along the coast to-morrow, and to stay at Anstruther house that night, have thought it expedient, according to their bounden duty, with all reverence and due respect, and with all the same solemnity they can, to wait upon his majesty, as he comes through this his majesty's burgh, and invite his majesty to eat and drink as he passes; and for that effect hath ordained, that the morn afternoon the town's colours be put upon the belfry of the steeple, and that at three o'clock the bells begin to ring, and ring on still till his majesty comes hither, and passes to Anstruther: And likewise, that the minister be spoken to, to be with the bailies and council, who are to be in their best apparel, and with them a guard of 24 of the ablest men, with partizans, and other 24 with muskets, all in their best apparel, William Sutherland commanding as captain of the guard; and to wait upon his majesty, and to receive his highness at the West Port, bringing his majesty and court through the town, until they come to Robert Smith's yeet, where an table is to be covered with my Lord's* best carpet: and that George Hetherwick have in readiness, of fine flour, some great buns, and other wheat-bread of the best order, baken with

Pittenweem.

* Johnsons.

* The Duke of Albany.

Dist. spo-
rum
||
Pityocam-
pasis.

Pisar,
Pius.

with sugar, cannell, and other spices sitting; and that James Richardson and Walter Airth have care to have ready eight or ten gallons of good strong ale, with Canary, sack, Rhenish wine, tent, white and claret wines, that his majesty and his court may eat and drink; and that in the mean time, when his majesty is present, the guard do diligently attend about the court; and so soon as his majesty is to go away, that a sign be made to Andrew Tod, who is appointed to attend the colours on the steeple head, to the effect he may give sign to those who attend the cannon of his majesty's departure, and then the *baill thirty-six cannons to be all shot at once*. It is also thought fitting, that the minister, and James Richardson the oldest bailie, when his majesty comes to the table, shew the great joy and sense this burgh has of his majesty's condescendence to visit the same, with some other expressions of loyalty. All which was acted." N. Lat. 56. 11. W. Long. 2. 49.

PITTOSPORUM, in botany; a genus of the monogynia order, belonging to the pentandria class of plants. The calyx is pentaphyllous, intusus and deciduous. The petals are five in number; the style thread shaped; the capsule somewhat angular, trilocular, and contain three or four angulated seeds, adhering to the capsule by means of a liquid resin in the loculaments. Of this there are three species, viz. 1. *Tenuifolium*. 2. *Umbellatum*. 3. *Coriaceum*. The first and second are natives of the Cape of Good Hope; the third grows in Madeira, and flowers in May and June.

PITUITARY GLAND. See **ANATOMY**, p. 758.

PITYOCAMPASIS, in entomology, the caterpillar of the pine-tree, received its compound name from that substance. It was considered as a poison, and as a remedy, according to its different employment; but our chief information is derived from M. Reaumur, who has attentively observed its manner of life. The animal cannot bear much cold, and is therefore never found in the higher latitudes. It is styled processionary, because it never leaves its hold, where many families reside, till the evening, when it feeds in trains, led on by two or three, and this train leaves a ribband of silk in its way for those behind follow exactly the steps of those which preceded, and each leaves its fibre of silk. Their nests are found in autumn; they are born the middle of September, become torpid in December, and recover their strength again in spring. They then descend from the trees, plunge into the earth, and undergo their last change. It is the bombyx pityocampa of Fabricius, (*Mantissa Insectorum*, tom. ii. p. 114. n° 66.), and greatly resembles the processionary caterpillar of the oak. The ancients used it as a vesicatory, and the acrimony seems to reside chiefly in a dust which is concealed in receptacles on its back. This is its offensive weapon, for it is thrown out at will, and produces very troublesome effects, though the hair of the animal and every part of its body seem to have a similar, but weaker power. The effect is also weaker in winter; but this may depend on the diminished irritability of the human body, as well as on the torpid state of the insect. Their silk is not sufficiently strong for the loom, and in hot water melts almost to a paste. In the earth it forms nests of stronger silk, but it is then found with difficulty: in boxes its silk is extremely tender. Adding to all these inconveniencies, handling the cones produces all the bad effects of the dust. Matthiolus recommends them

as a styptic, and perhaps they may serve for burning on the skin instead of moxa, the downy silk of a species of artemisia. The ancients, afraid of its hurtful qualities, used them with caution, and enacted laws against their being sold promiscuously: the modern planter is chiefly afraid of them because they destroy the beauty of his trees, and he endeavours to collect the eggs by cutting off the branches, which are burnt immediately.

PIVAT, or **PIVOT**, a foot or shoe of iron or other metal, usually conical or terminating in a point, whereby a body, intended to turn round, bears on another fixed at rest, and performs its revolutions. The pivot usually bears or turns round in a sole, or piece of iron or brass hollowed to receive it.

PIUS II. (*Æneas-Sylvius Piccolomini*), was born on the 18th of October 1405, at Corsigni in Sieneze, the name of which he afterwards changed into that of *Pienza*. His mother Victoria Forteguerra, when she was with child of him, dreamed that she should be delivered of a mitred infant; and as the way of degrading clergymen at that time was by crowning them with a paper mitre, she believed that Æneas would be a disgrace to his family. But what to her had the appearance of being a disgrace, was a presage of the greatest honours. Æneas was carefully educated, and made considerable proficiency in the belles lettres. After having finished his studies at Sienna, he went in 1431 to the council of Bale with Cardinal Capranica, surnamed *De Fermo*, because he was entrusted with the government of that church. Æneas was his secretary, and was then only 26 years of age. He afterwards acted in the same capacity to some other prelates, and to Cardinal Albergati. The council of Bale honoured him with different commissions, in order to recompense him for the zeal with which he defended that assembly against Pope Eugene IV. He was afterwards secretary to Frederic III. who decreed to him the poetic crown, and sent him ambassador to Rome, Milan, Naples, Bohemia, and other places. Nicolas V. advanced him to the bishopric of Trieste, which he quitted some time after for that of Sienna. At last, after having distinguished himself in various nunciatures, he was invested with the Roman purple by Calixtus III. whom he succeeded two years after on the 27th of August 1458. Pius II. now advanced to the holy see, made good the proverb, *Honores mutant mores*. From the commencement of his pontificate, he appeared jealous of the papal prerogatives. In 1460 he issued a bull, "declaring appeals from the pope to a council to be null, erroneous, detestable, and contrary to the sacred canons." That bull, however, did not prevent the procurator-general of the parliament of Paris from appealing to a council in defence of the Pragmatic sanction, which the pope had strenuously opposed. Pius was then at Mantua, whither he had gone in order to engage the Catholic princes to unite in a war against the Turks. The greater part of them agreed to furnish either troops or money; others refused both, particularly the French, who from that moment incurred his holiness's aversion. That aversion abated under Louis XI. whom he persuaded in 1461 to abolish the Pragmatic sanction, which the parliament of Paris had supported with so much vigour.

The following year, 1462, was rendered famous by

Pius.

a controversy which took place between the Cordeliers and Dominicans, whether or not the blood of Jesus Christ was separated from his body while he lay in the grave. It was also made a question whether it was separated from his divinity. The Cordeliers affirmed that it was, but the Dominicans were of an opposite opinion. They called each other heretics; which obliged the pope to issue a bull, forbidding them under pain of censure to brand one another with such odious epithets. The bull which his Holiness published on the 26th of April, retracting what he had written to the council of Bale when he was its secretary, did not redound much to his honour. "I am a man (says he), and as a man I have erred. I am far from denying that a great many things which I have said and written may deserve condemnation. Like Paul, I have preached through deception, and I have persecuted the church of God through ignorance. I imitate the blessed Augustin, who having suffered some erroneous sentiments to creep into his works, retracted them. I do the same thing; I frankly acknowledge my ignorances, from a fear lest what I have written in my younger years should be the occasion of any error that might afterwards be prejudicial to the interests of the holy see. For if it be proper for any one to defend and support the eminence and glory of the first throne of the church, it is in a peculiar manner my duty, whom God, out of his mercy and goodness alone, without any merit on my part, has raised to the dignity of vicar of Jesus Christ. For all these reasons, we exhort and admonish you in the Lord, not to give credit to those writings of ours which tend in any degree to hurt the authority of the apostolic see, and which establish opinions that are not received by the Roman church. If you find, then, any thing contrary to her doctrine either in our dialogues, in our letters, or in any other of our works, despise these opinions, reject them, and adopt our present sentiments. Believe me rather now that I am an old man, than when I addressed you in my earlier days. Esteem a sovereign pontiff more than a private person; except against Aeneas Sylvius, but receive Pius II." It might be objected to his Holiness, that it was his dignity alone which had made him alter his opinion. He anticipates that objection, by giving a short account of his life and actions, with the whole history of the council of Bale, to which he went with Cardinal Capranica in 1431; "but (says he) I was then a young man, and without any experience, like a bird just come from its nest." In the mean time, the Turks were threatening Christendom. Pius, ever zealous in the defence of religion against the infidels, forms the resolution of fitting out a fleet at the expense of the church, and of passing over into Asia himself, in order to animate the Christian princes by his example. He repaired to Ancona with a design to embark; but he there fell sick with the fatigue of the journey, and died on the 16th of August 1464, aged 59 years. Pius was one of the most learned men of his time, and one of the most zealous pontiffs; but being of an ambitious and pliant disposition, he sometimes sacrificed to that ambition. His principal works are, 1. Memoirs of the council of Bale, from the suspension of Eugenius to the election of Felix. 2. The history of the Bohemians,

from their origin to the year 1454. 3. Two books on cosmography. 4. The history of Frederic III. whose vice-chancellor he had been. This performance was published in 1785 in folio, and is believed to be pretty accurate and very particular. 5. A treatise on the education of children. 6. A poem upon the passion of Jesus Christ. 7. A collection of 432 letters, printed at Milan, 1473, in folio, in which are found some curious anecdotes. 8. The memoirs of his own life, published by John Gobelin Peronne his secretary, and printed at Rome in 4to in 1584. There is no doubt of this being the genuine production of that pontiff. 9. *Historiarum ubique gentium*, of which only the first part was published at Venice in 1477 in folio. His works were printed at Helmstadt in 1755, in folio, at the beginning of which we find his life. That verse of Virgil's *Aeneid* (lib. i. v. 382.) which begins thus,

Sum pius Aeneas, ———

and the end of the following verse,

————— *sum super aethera notus,*

have been applied to him.

Pius IV. (John Angel Cardinal de Medicis), of a different family from that of Florence, was born at Milan in 1499. He was son to Bernardin Medecchini, and brother of the famous Marquis de Marignan, Charles Vth's general. He raised himself by his own merit, and filled several important offices under Popes Clement VII. and Paul III. Julius III. who had entrusted him with several legations, honoured him with a cardinal's hat in 1540. After the death of Paul IV. he was advanced to St Peter's chair on the 25th of December 1559. His predecessor had rendered himself detestable to the Romans, who treated his memory with every mark of indignity, and Pius IV. commenced his pontificate by pardoning them. He did not, however, extend the same clemency to the nephews of Pope Paul IV.; for he caused Cardinal Caraffe to be strangled in the castle of St Angelo, and his brother, the Prince de Paliano, to be beheaded. His zeal was afterwards directed against the Turks and heretics. In order to stop, if possible, the progress of these last, he renewed the Council of Trent, which had been suspended. He knew well (says Abbé de Choisy), that that council might make some regulations which would have the effect to lessen his authority; but on the other hand, he perceived that great inconveniences might result from its not being assembled; and "in the main (said he to his confidants) it is better to feel evil for one than to be always in dread of it." In 1561 he dispatched nuncios to all the Catholic and Protestant princes, to present them with the bull for calling that important assembly. An end was, however, put to it by the industry of his nephew, S. Charles Borromeus, in 1563; and, on the 26th of January the year following, he issued a bull for confirming its decrees. In 1563 a conspiracy was formed against his life by Benedict Acoki, and some other visionaries. Those madmen had taken it into their head that Pius IV. was not a lawful Pope, and that after his death they would place another in St Peter's chair, with the title of *Pope Angelus*, under whom errors might be reformed, and peace restored to the church. The conspiracy was discovered, and the fanatic Benedict put to death. This pontiff died a little

Pius.

the time after, on the 9th of December 1565, aged 66 years, carrying to the grave with him the hatred of the Romans, whom his severities had exasperated. He was a man of great address, and very fruitful in his resources. He adorned Rome with several public edifices; but these ornaments tended greatly to impoverish it. If he was the instrument of raising his relations in the world, it must be allowed, at least, that the greater part of them did him honour.

Pius V. (S. Michael Ghisleri), born at Boschi or Bosco, in the diocese of Fortona, on the 17th of January 1504, was, according to Abbé de Choisy, son to a senator of Milan. He turned a Dominican friar. Paul IV. informed of his merit and virtue, gave him the bishopric of Sutri, created him cardinal in 1557, and made him inquisitor-general of the faith among the Milanese and in Lombardy; but the severity with which he exercised his office obliged him to quit that country. He was sent to Venice, where the ardour of his zeal met with still greater obstacles. Pius IV. added to the cardinal's hat the bishopric of Mondovi. After the death of that pontiff, he was advanced to St Peter's chair in 1566. The Romans expressed but little joy at his coronation: he was very sensible of it, and said, "*I hope they will be as sorry at my death as they are at my election;*" but he was mistaken. Raised by his merit to the first ecclesiastical preferment in Christendom, he could not divest himself of the severity of his character; and the situation in which he found himself rendered, perhaps, that severity necessary. One of his first objects was to repress the luxury of the clergy, the pride of the cardinals, and the licentious manners of the Romans. He caused the decrees of reformation enacted by the Council of Trent to be put in execution; he prohibited bull-baiting in the Circus; he expelled from Rome the women of the town; and allowed the cardinals to be prosecuted for their debts. The errors which overflowed the Christian world gave him great uneasiness. After having employed gentle and lenient measures in the reclaiming of heretics, he had recourse to severity, and some of them ended their days in the flames of the inquisition. He particularly displayed his zeal for the grandeur of the Holy See in 1568, by ordaining that the bull *In cena domini*, which was published at Rome every year on *Maunday Thursday*, and which Clement XIV. suppressed, should be published likewise throughout the whole church. That bull, the work of several sovereign pontiffs, principally regards the jurisdiction of the ecclesiastical and civil power. It anathematizes those who appeal from the decrees of popes to a general council; those who favour the appellants; the universities which teach that the pope is subject to a general council; the princes who would restrain the ecclesiastical jurisdiction, or who exact contributions from the clergy. It was rejected by all the sovereign states, excepting a very few. In 1580, some bishops having endeavoured to introduce it into their dioceses, the parliament caused their temporalities to be seized upon, and declared those guilty of high treason who should imitate the fanaticism of those prelates. Pius V. for some time meditated an expedition against the Turks. He had the courage to make war on the Ottoman empire, by forming a league with the Venetians and Philip II. king of Spain. This was the first time that the standard of the two keys was seen displayed against the

crescent. The naval armies came to an engagement, on the 7th of October 1571, in Lepanto Bay, in which the confederate Christian princes obtained a signal victory over the Turks, who lost above 30,000 men, and near 200 galleys. This success was principally owing to the Pope, who exhausted both his purse and person in fitting out that armament. He died of the gravel six months after, on the 30th of April 1572, aged 68. He repeated often, in the midst of his sufferings, "*O Lord! increase my pains and my patience.*" His name will for ever adorn the list of Roman pontiffs. It is true that his bull against queen Elizabeth, and his other bull in favour of the inquisition, with his rigorous prosecution of heretics both in France and Ireland, prove that he had more zeal than sweetness in his temper; but in other respects he possessed the virtues of a saint and the qualities of a king. He was the model of the famous Sixtus Quintus, to whom he gave an example of amassing in a few years such savings as were sufficient to make the Holy See be regarded as a formidable power. Sultan Selim, who had no greater enemy than this pope, caused public rejoicings to be made at Constantinople for his death during the space of three days. The pontificate of Pius is also celebrated for the condemnation of Baius, the extinction of the order of Humilies, and the reformation of that of the Cistercians. He was canonized by Clement XI. in 1712. There are extant several of his letters, printed at Anvers in 1640, in 4to. Felibian, in 1672, published his *Life*, translated from the Italian of Agatio di Somma; but we cannot vouch for the fidelity of the translation.

PIX. See *MINT-MARKS*.

PIZARRO (Francis), a celebrated Spanish general, the discoverer and conqueror of Peru, in conjunction with Diego Almagro, a Spanish navigator. They are both charged with horrid cruelties to the inhabitants; and they fell victims to their own ambition, jealousy, and avarice. Almagro revolting, was defeated and beheaded by Pizarro, who was assassinated by Almagro's friends in 1541. See *PERU*.

PLACE, *locus*, in philosophy, a mode of space, or that part of immoveable space which any body possesses. See *METAPHYSICS*, n° 185.

PLACE, in astronomy. The place of the sun, a star, &c. denotes the sign and degree of the zodiac which the luminary is in; or the degree of the ecliptic, reckoning from the beginning of aries, which the planet or star's circle of longitude cuts; and therefore coincides with the longitude of the sun, planet, or star. As the sine of the sun's greatest declination $23^{\circ} 30'$: to the sine of any present declination given or observed, for instance, $23^{\circ} 15'$:: so is the radius 10 : to the sine of his longitude $81^{\circ} 52'$; which, if the declination were north, would give $20^{\circ} 52'$ of gemini; if south, $20^{\circ} 52'$ of capricorn, for the sun's place. See *DECLINATION*, &c.

The place of the moon being that part of her orbit wherein she is found at any time, is of various kinds, by reason of the great inequalities of the lunar motions, which render a number of equations and reductions necessary before the just point be found. The moon's fictitious place is her place once equated; her place nearly true, is her place twice equated; and her true place thrice equated. See *ASTRONOMY*, *passim*.

PLACES, in war, a general name for all kinds of fortresses

Place
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Placentia.

treffes where a party may defend themselves. Thus, 1. A strong or fortified place is one flanked, and covered with bastions. 2. A regular place, one whose angles, sides, bastions, and other parts, are equal; and this is usually denominated from the number of its angles, as a pentagon, hexagon, &c. 3. Irregular place is one whose sides and angles are unequal.— 4. Place of arms is a strong city or town pitched upon for the chief magazine of an army; or, in a city or garrison, it is a large open spot of ground, usually near the centre of the place where the grand guard is commonly kept, and the garrison holds its rendezvous at reviews, and in cases of alarm to receive orders from the governor. 5. Places of arms of an attack, in a siege, is a spacious place covered from the enemy by a parapet or epaulement, where the soldiers are posted ready to sustain those at work in the trenches against the soldiers of the garrison. 6. Place of arms particular, in a garrison, a place near every bastion, where the soldiers sent from the grand place to the quarters assigned them relieve those that are either upon the guard or in fight. 7. Place of arms without, is a place allowed to the covert way for the planting of cannon, to oblige those who advance in their approaches to retire. 8. Place of arms in a camp, a large place at the head of the camp for the army to be ranged in and drawn up in battalia. There is also a place for each particular body, troop, or company, to assemble in.

Common PLACE. See COMMON-Place.

PLACENTA, in anatomy and midwifery, a soft roundish mass, found in the womb of pregnant women; which, from its resemblance to the liver, was called by the ancients *hepar uterinum*, uterine liver.

PLACENTIA, called by the natives *Piacenza*, is a town of Italy, and capital of a duchy of the same name, with a bishop's see. It is seated about 100 paces from the river Po, in a very fertile pleasant plain, watered by a great number of rivulets, and surrounded with hills, abounding in all sorts of fruits. In its territory there are salt springs, from which they make a very white salt; and there are also mines of iron, woods, and warrens. It contains a great number of merchants, and is reckoned three miles in circumference. Its fortifications are inconsiderable, but the citadel is pretty strong. The streets are straight, and the principal street, called *Stradone*, is 25 common paces broad and 3000 feet long, in a direct line, with 600 stone posts, for separating the foot from the carriage-way, and on both sides are 11 spacious convents. The other buildings of the city are not very remarkable, though it contains 45 churches, 28 convents, and two almshouses. The cathedral is pretty much in the Gothic taste; but the church of the Augustines is reckoned the most beautiful, and esteemed worthy of its architect, the celebrated Vignoli. The ducal palace, though large, makes no great appearance on the outside; but within are some good apartments. In the area before the town-house stands two admirable brass statues of Alexander and Renatus IV. both of the house of Farnese, and dukes of Parma and Placentia. The bishop is suffragan to the archbishop of Milan. At this city begins the *Via Æmilia*, which extends as far as Rimini on the Adriatic. The number of the inhabitants is about 30,000, among whom there are 2000

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ecclesiastics. This city has been taken several times in the wars of Italy. The king of Sardinia took possession of it in 1744, it being ceded to him by the queen of Hungary; but it was taken from him in 1746, after a bloody battle. It has a famous university, and the inhabitants are much esteemed for their politeness. There is a great fair here every year on the 15th of April, which is much frequented. It is about 32 miles north-west of Parma and 83 east of Turin. E. Long. 10. 24. N. Lat. 45. 5.

PLAGIARY, in philology, the purloining another man's works, and putting them off as our own. Among the Romans, *plagiarius* was properly a person who bought, sold, or retained a freeman for a slave; and was so called, because, by the Flavian law, such persons were condemned *ad plagas*, "to be whipped."

Thomasius has an express treatise *De plagio literario*; wherein he lays down the laws and measures of the right which authors have to one another's writings.— "Dictionary-writers, at least such as meddle with *arts and sciences* (as is pertinently observed by Mr Chambers), seem exempted from the common laws of *meum and tuum*; they do not pretend to set up on their own bottom, nor to treat you at their own cost. Their works are supposed, in great measure, compositions of other peoples; and what they take from others, they do it avowedly, and in the open sun.—In effect, their quality gives them a title to every thing that may be for their purpose, wherever they find it; and if they rob, they do not do it any otherwise than as the bee does, for the public service. Their occupation is not pillaging, but collecting contributions; and if you ask them their authority, they will produce you the practice of their predecessors of all ages and nations."

PLAGIUM, in law. See KIDNAPPING.

PLAGUE, PESTILENCE, or *Pestilential Fever*, is a very acute, malignant, and contagious disease; being a putrid fever of the worst kind, and seldom failing to prove mortal. Though it is generally defined a malignant fever, Diemerbroeck thinks they ought to be distinguished, since the fever is not the essence of the disease, but merely a symptom or effect of it. See MEDICINE, n° 221.

The plague, as is generally agreed, is never bred or propagated in Britain, but always imported from abroad, especially from the Levant, Lesser Asia, Egypt, &c. where it is very common. Sydenham has remarked that it rarely infects this country oftener than once in 40 years, and happily we have been free of it for a much longer period.

Authors are not as yet agreed concerning the nature of this dreadful distemper. Some think that insects are the cause of it, in the same way that they are the cause of blights, being brought in swarms from other climates by the wind, when they are taken into the lungs in respiration; the consequence of which is, that they mix with the blood and juices, and attack and corrode the viscera. Mr Boyle, on the other hand, thinks it originates from the effluvia or exhalations breathed into the atmosphere from noxious minerals, to which may be added stagnant waters and putrid bodies of every kind.

Mr Gibbon thinks that the plague is derived from damp, hot, and stagnating air, and the putrefaction

Plagiary
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Plague.

Plague.

Plague.

of animal substances, especially locusts. See *Gibbon's Roman History*, 4to edit. vol. iv. p. 327—332, where there is also a very particular account of the plague which depopulated the earth in the time of the Emperor Justinian.

The Mahometans believe that the plague proceeds from certain spirits, or goblins, armed with bows and arrows, sent by God to punish men for their sins; and that when the wounds are given by spectres of a black colour, they certainly prove fatal, but not so when the arrows are shot by those that appear white. They therefore take no precaution to guard themselves against it. The wiser professors of this religion, however, at present act otherwise; for we find a receipt recommended by Sidy Mohammed Zerroke, one of the most celebrated Marabout's, prefaced with these remarkable words: "The lives of us all are in the hands of God, when it is we must die. However, it hath pleased him to save many persons from the plague, by taking every morning while the infection rages one pill or two of the following composition; viz. of myrrh two parts, saffron one part, of aloes two parts, of syrup of myrtle-berries, *q. s.* But this remedy is confined to the more enlightened; for the bigotry of the lower sort is so extreme as to make them despise all precautions which people of other nations use. Of this extreme and foolish prejudice Dr Chandler gives an interesting account when speaking of the plague at Smyrna. This learned author is of opinion that the disease arises from animalcules, which he supposes to be invisible. See *Chandler's Travels in Asia Minor*, p. 279, &c.

It is a remarkable fact, that *plagues* are sometimes partial, and that they only attack particular animals, or a particular description of persons, avoiding others altogether, or attacking them but slightly. Thus Fernelius informs us of a plague, or murrain, in 1514, which invaded only cats. Dionysius Halicarnassensis mentions a plague which attacked none but maids; and that which raged in the time of Gentilis, killed scarce any women, and very few but lusty men. Bouterus mentions another plague, which assaulted none but the younger sort; and we have instances of the same kind of a later standing (A). Cardan speaks of a plague at Basil, with which the Switzers were infected, and the Italians, Germans, or French, exempted: and John Utenhovius takes notice of a dreadful one at Copenhagen, which, tho' it raged among the Danes, spared the Germans, Dutch, and English, who went with all freedom, and without the least danger, to the houses of the infected. During the plague which ravaged Syria in 1760, it was observed that people of the soundest constitutions were the most liable to it, and that the weak and delicate were either spared or easily cured. It was most fatal to the Moors; and when it attacked them it was generally incurable.

When the plague raged in Holland in 1636, a young girl was seized with it, had three carbuncles, and was removed to a garden, where her lover, who was betrothed to her, attended her as a nurse, and slept with her as his wife. He remained uninfected, and she recovered, and was married to him. The story is related

by Vinc. Fabricius in the *Misc. Cur. Ann. II. Obs.* 188.

Many methods have been adopted in different countries to prevent the importation of this dreadful scourge of the human race, and to stop the progress of infection after it has been imported. In England, mayors, bailiffs, head officers of corporations, and justices of peace, have power to tax inhabitants, houses, and lands, &c. within their precincts, for the relief of persons infected with the plague; and justices of the county may tax persons within five miles round, on a parish's inability; the tax to be levied by distress and sale of goods, or in default thereof by imprisonment. Infected persons going abroad, after being commanded to keep house for avoiding farther infection, may be resisted by watchmen, &c. and punished as vagrants, if they have no sores upon them; and if they have infectious sores on them it is felony. Justices of peace, &c. are to appoint searchers, examiners, and buriers of the dead, in places infected, and administer oaths to them for the performance of their duties, &c. *stat. 1 Jac. 1. cap. 31.* See QUARANTINE.

The commission at Moscow having, in the year 1770, invented a fumigation-powder, which, from several lesser experiments, had proved efficacious in preventing the infection of the plague; in order more fully to ascertain its virtue in that respect, it was determined, towards the end of the year, that ten malefactors under sentence of death should, without undergoing any other precautions than the fumigations, be confined three weeks in a lazaretto, be laid upon the beds, and dressed in the clothes, which had been used by persons sick, dying, and even dead, of the plague in the hospital. The experiment was accordingly tried, and none of the ten malefactors were then infected, or have been since ill. The fumigation-powder is prepared as follows.

Powder of the first strength.] Take leaves of juniper, juniper-berries pounded, ears of wheat, guaiacum-wood pounded, of each six pounds; common saltpetre pounded, eight pounds; sulphur pounded, six pounds; Smyrna tar, or myrrh, two pounds; mix all the above ingredients together, which will produce a pood of the powder of fumigation of the first strength. [*N. B.* A pood is 40 pounds Russian, which are equal to 35 pounds and a half or 36 pounds English avoirdupoise.]

Powder of the second strength.] Take southernwood cut into small pieces, four pounds; juniper-berries pounded, three pounds; common saltpetre pounded, four pounds; sulphur pounded, two pounds and a half; Smyrna tar, or myrrh, one pound and a half: mix the above together, which will produce half a pood of the powder of fumigation of the second strength.

Odoriferous powder.] Take the root called *kalmus* cut into small pieces, three pounds; leaves of juniper cut into small pieces, four pounds; frankincense pounded grossly, one pound; storax pounded, and rose-flowers, half a pound; yellow amber pounded, one pound; common saltpetre pounded, one pound and a half; sulphur, a quarter of a pound: mix all the above

(A) See the account of the *yellow fever* under the article PHILADELPHIA, where we find that that disease was less fatal to some sorts of persons than to others.

Plague. above together, which will produce nine pounds and three quarters of the odoriferous powder.

Remark on the powder of fumigation.] If guaiacum cannot be had, the cones of pines or firs may be used in its stead; likewise the common tar of pines and firs may be used instead of the Smyrna tar, or myrrh, and mugwort may supply the place of southernwood.

Thucydides, who was himself infected, lib. ii. gives us an account of a dreadful plague which happened at Athens about the year before Christ 430, while the Peloponnesians under the command of Archidamus wasted all her territory abroad; but of these two enemies the plague was by far the most dreadful and severe.

The most dreadful plague that ever raged at Rome was in the reign of Titus, A. D. 80. The emperor left no remedy unattempted to abate the malignity of the distemper, acting during its continuance like a father to his people. The same fatal disease raged in all the provinces of the Roman empire in the reign of M. Aurelius, A. D. 167, and was followed by a dreadful famine, by earthquakes, inundations, and other calamities. The Romans believed that Æsculapius sometimes entered into a serpent, and cured the plague.

About the year 430 the plague visited Britain, just after the Picts and Scots had made a formidable invasion of the southern part of the island. The plague raged with uncommon fury, and swept away most of those whom the sword and famine had spared, so that the living were scarce sufficient to bury the dead.

About the year 1348 the plague became almost general over Europe. A great many authors give an account of this plague, which is said to have appeared first in the kingdom of Kathay in the year 1346, and to have proceeded gradually westward to Constantinople and Egypt. From Constantinople it passed into Greece, Italy, France, and Africa, and by degrees along the coasts of the ocean into Britain and Ireland, and afterwards into Germany, Hungary, Poland, Denmark, and the other northern kingdoms. According to Antoninus archbishop of Florence the distemper carried off 60,000 people in that city, among whom was the historian John Villani.

In the year 1656 the plague was brought from Sardinia to Naples, being introduced into the city by a transport with soldiers on board. It raged with excessive violence, carrying off in less than six months 400,000 of the inhabitants. The distemper was at first called by the physicians a malignant fever; but one of them affirming it to be pestilential, the viceroy, who was apprehensive lest such a report would occasion all communication with Naples to be broke off, was offended with this declaration, and ordered him to be imprisoned. As a favour, however, he allowed him to return and die in his own house. By this proceeding of the viceroy, the distemper being neglected, made a most rapid and furious progress, and filled the whole city with consternation. The streets were crowded with confused processions, which served to spread the infection through all the quarters. The terror of the people increased their superstition; and it being reported that a certain nun had prophesied that the pestilence would cease upon building a hermitage for her sister nuns upon the hill of St Martin's, the edifice was immediately begun with the most ardent zeal. Persons of the highest quality strove who should per-

form the meanest offices; some loading themselves with beams, and others carrying baskets full of lime and nails, while persons of all ranks stripped themselves of their most valuable effects, which they threw into empty hogsheds placed in the streets to receive the charitable contributions. Their violent agitation, however, and the increasing heats, diffused the malady through the whole city, and the streets and the stairs of the churches were filled with the dead; the number of whom, for some time of the month of July, amounted daily to 15,000.

The viceroy now used all possible precautions to abate the fury of the distemper, and to prevent its spreading to the provinces. The infection, however, desolated the whole kingdom, excepting the provinces of Otranto and the Farther Calabria, and the cities of Gaeta, Sorrento, Paolo, and Belvedere. The general calamity was increased in Naples by malecontents, who insinuated that the distemper had been designedly introduced by the Spaniards, and that there were people in disguise who went through the city sowing poisoned dust. This idle rumour enraged the populace, who began to insult the Spanish soldiers, and threaten a sedition; so that the viceroy, to pacify the mob, caused a criminal to be broke upon the wheel, under pretence that he was a disseminator of the dust. A violent and plentiful rain falling about the middle of August, the distemper began to abate; and on the eighth of December the physicians made a solemn declaration that the city was entirely free from infection.

Of the dreadful plague which raged at London in the year 1665, the reader will find an account in the article LONDON, n^o 21. In 1720 the city of Marseilles was visited with this destructive disease, brought in a ship from the Levant; and in seven months, during which time it continued, it carried off not less than 60,000 people. This desolation is not yet obliterated from the minds of the inhabitants; some survivors remained alive but a few years ago to transmit a traditional account of it to after ages. There are two fine pictures painted by Puget representing some of the horrid scenes of that time. "They are (says lady Craven) only too well executed. I saw several dying figures taking leave of their friends, and looking their last anxious, kind, and wishful prayers on their sick infants, that made the tears flow down my cheeks. I was told the physicians and noblemen who were assisting the sick and dying, were all portraits: I can easily conceive it; for in some faces there is a look of reflection and concern which could only be drawn from the life." *Letters*, p. 34, 35. This fatal event has caused the laws of quarantine to be very strictly enforced in the Lazaretto here, which is an extensive insulated building.

The ravages of this disease have been dreadful wherever it has made its appearance. On the first arrival of the Europeans at the island of Gran Canaria, it contained 14,000 fighting men, soon after which, two thirds of the whole inhabitants fell a sacrifice to the plague, which had doubtless been introduced by their new visitors. The destruction it has made in Turkey in Europe, and particularly in Constantinople, must be known to every reader; and its fatal effects have been particularly heightened there by that firm belief which prevails among the people of predestination, &c. as has been already mentioned. It is generally

Plague.

Plain
Plancus.

brought into European Turkey from Egypt; where it is very frequent, especially at *Grand Cairo*. To give even a list of all the plagues which have desolated many flourishing countries, would extend this article beyond all bounds, and minutely to describe them all would be impossible. For the plague at Smyrna, we refer to Chaudier's Travels as above. Respecting that which raged in Syria in 1765, we refer to the Abbé Mariti's Travels through Cyprus, Syria, and Palestine, vol. 1st, p. 278—296. This plague was one of the most malignant and fatal that Syria ever experienced; for it scarcely made its appearance in any part of the body when it carried off the patient.

PLAIN, or PLANE, in general, an appellation given to whatever is smooth and even, or simple, obvious, and easy to be understood; and, consequently, stands opposed to rough, enriched, or laboured.

A plain figure, in geometry, is an uniform surface; from every point of whose perimeter right lines may be drawn to every other point in the same.

A plain angle is one contained under two lines, or surfaces, in contradistinction to a solid angle. See *ANGLE*.

The doctrine of plain triangles, as those included under three right lines, is termed *plain trigonometry*. See the article *TRIGONOMETRY*.

PLAIN Chart. See the article *CHART*.

PLAIN-Sailing. See *NAVIGATION*, p. 685.

PLAISE, the English name of a species of pleuronectes. See *PLEURONECTES*.

PLAN, in general, denotes the representation of something drawn on a plane; such are maps, charts, ichnographies, &c. See *MAP*, *CHART*, &c.

The term *plan*, however, is particularly used for a draught of a building, such as it appears, or is intended to appear, on the ground, showing the extent, division, and distribution of its area or ground-plot into apartments, rooms, passages, &c.

A geometrical plan is that wherein the solid and vacant parts are represented in their natural proportions.

The raised plan of a building is the same with what is otherwise called an *elevation* or *orthography*. See *ORTHOGRAPHY*.

A perspective plan is that exhibited by degradations or diminutions, according to the rules of perspective. See *PERSPECTIVE*.

To render plans intelligible, it is usual to distinguish the masses with a black wash; the projectures on the ground are drawn in full lines, and those supposed over them in dotted lines. The augmentations or alterations to be made are distinguished by a colour different from what is already built; and the tints of each plan made lighter as the stories are raised.

In large buildings it is usual to have three several plans for the three first stories,

PLANCUS (Francis), doctor of physic, born at Amiens in 1696, and who died on the 19th of September 1765, aged 69 years, is author of some works which do honour to his memory. 1. A complete *System of Surgery*, in 2 vols in 12mo; a treatise much recommended by surgeons to their pupils. 2. A choice *Library of Medicine*, taken from periodical publications, both French and others: this curious collection, con-

tinued and completed by M. Goulin, makes 9 vols in 4to, or 18 vols in 12mo. 3. A Translation of Vander Wiel's *Observations on Medicine and Surgery*, 1738, 2 vols in 12mo. Plancus was the editor of various editions of works on medicine and surgery, and enriched them with notes. He shut himself up in his study for a long time before he practised his profession.

PLANE, in geometry, denotes a plane surface, or one that lies evenly between its bounding lines: and as a right line is the shortest extension from one point to another, so a plane surface is the shortest extension from one line to another.

In astronomy, conics, &c. the term *plane* is frequently used for an imaginary surface, supposed to cut and pass through solid bodies; and on this foundation is the whole doctrine of conic sections built. See *ASTRONOMY*, *CONIC Sections*, &c.

In mechanics planes are either horizontal, that is, parallel to the horizon, or inclined thereto. See *MECHANICS*.

The determining how far any given plane deviates from an horizontal line, makes the whole business of levelling. See the article *LEVELLING*.

In optics, the planes of reflection and refraction are those drawn through the incident and reflected or refracted rays. See *OPTICS*.

In perspective we meet with the perspective plane, which is supposed to be pellucid, and perpendicular to the horizon; the horizontal plane, supposed to pass through the spectator's eye, parallel to the horizon; the geometrical plane, likewise parallel to the horizon, wherein the object to be represented is supposed to be placed, &c. See *PERSPECTIVE*.

The plane of projection in the stereographic projection of the sphere, is that on which the projection is made, corresponding to the perspective plane. See *PROJECTION*.

PLANE, in joinery, an edged tool or instrument for parting and shaving of wood smooth.—It consists of a piece of wood very smooth at bottom, as a stock or shaft; in the midst of which is an aperture, through which a steel edge, or chissel, placed obliquely, passes; which, being very sharp, takes off the inequalities of the wood along which it slides.

PLANE-Tree, in botany. See *PLATANUS*.

PLANET, a celestial body, revolving round the sun as a centre, and continually changing its position with respect to the fixed stars; whence the name *planet*, which is a Greek word, signifying "wanderer."

The planets are usually distinguished into primary and secondary. The primary ones, called by way of eminence *planets*, are those which revolve round the sun as a centre; and the secondary planets, more usually called *satellites* or *moons*, are those which revolve round a primary planet as a centre, and constantly attend it in its revolution round the sun.

The primary planets are again distinguished into superior and inferior. The superior planets are those farther from the sun than our earth; as Mars, Jupiter, Saturn, and the Georgium Sidus; and the inferior planets are those nearer the sun than our earth, as Venus and Mercury. See *ASTRONOMY*.

That the planets are opaque bodies, like our earth, is thought probable for the following reasons. 1. Since in Venus, Mercury, and Mars, only that part of the disk

Plane,
Planet.

Planet
H
Planetary.

disk illuminated by the sun is found to shine; and again, Venus and Mercury, when between the earth and the sun, appear like dark spots or macule on the sun's disk; it is evident, that Mars, Venus, and Mercury, are opaque bodies, illuminated with the borrowed light of the sun. And the same appears of Jupiter, from its being void of light in that part to which the shadow of the satellites reaches, as well as in that part turned from the sun; and that his satellites are opaque, and reflect the sun's light, is abundantly shewn. Again, since Saturn, with his ring and satellites, only yield a faint light, fainter considerably than that of the fixed stars, though these be vastly more remote, and than that of the rest of the planets; it is past doubt that he too with his attendants are opaque bodies. 2. Since the sun's light is not transmitted through Mercury and Venus, when placed against him, it is plain they are dense opaque bodies; which is likewise evident of Jupiter, from his hiding the satellites in his shadow; and therefore, by analogy, the same may be concluded of Saturn. 3. From the variable spots of Venus, Mars, and Jupiter, it is evident these planets have a changeable atmosphere; which changeable atmosphere may, by a like argument, be inferred of the satellites of Jupiter; and therefore, by similitude, the same may be concluded of the other planets. 4. In like manner, from the mountains observed in Venus, the same may be supposed in the other planets. 5. Since, then, Saturn, Jupiter, and the satellites of both, Mars, Venus, and Mercury, are opaque bodies shining with the sun's borrowed light, are furnished with mountains, and encompassed with a changeable atmosphere; they have, of consequence, waters, seas, &c. as well as dry land, and are bodies like the moon, and therefore like the earth. *Q. E. D.* And hence it seems also highly probable, that the other planets have their animal inhabitants as well as our earth.

PLANETARIUM, an astronomical machine, so called from its representing the motions, orbits, &c. of the planets, agreeable to the Copernican system. See **ASTRONOMY**, n^o 489. and Plate LXXXVIII.

PLANETARY, something that relates to the planets. Hence we say, planetary worlds, planetary in-

habitants, &c. Huygens and Fontenelle bring several probable arguments for the reality of planetary animals, plants, men, &c. See **PLANET**.

PLANETARY System, is the system or assemblage of the planets, primary and secondary, moving in their respective orbits, round their common centre the sun. See **ASTRONOMY**.

PLANETARY Days.—Among the ancients, the week was shared among the seven planets, each planet having its day. This we learn from Dion Cassius and Plutarch, *Sympos.* l. 4. q. 7. Herodotus adds, that it was the Egyptians who first discovered what god, that is, what planet, presides over each day; for that among this people the planets were directors. And hence it is, that in most European languages the days of the week are still denominated from the planets; Sunday, Monday, &c. See **WEEK**.

PLANETARY Years, the periods of time in which the several planets make their revolutions round the sun or earth.—As from the proper revolution of the sun, the solar year takes its original; so from the proper revolutions of the rest of the planets about the earth, so many sorts of years do arise, viz. the Saturnian year, which is defined by 29 Egyptian years, 174 hours, 58 minutes, equivalent in a round number to 30 solar years.—The Jovial year, containing 317 days, 14 hours, 59 minutes.—The Martial year, containing 321 days, 23 hours, 31 minutes.—For Venus and Mercury, as their years, when judged of with regard to the earth, are almost equal to the solar year; they are more usually estimated from the sun, the true centre of their motions: in which case, the former is equal to 224 days, 16 hours, 40 minutes; the latter to 87 days, 23 hours, 14 minutes.

PLANIMETRY, that part of geometry which considers lines and plain figures, without considering their height or depth. See **GEOMETRY**.

PLANISPHERE, signifies a projection of the sphere, and its various circles on a plane; in which sense, maps, whereon are exhibited the meridians and other circles of the sphere, are planispheres. See **MAP**.

Planetary
H
Planisphere

E R R A T A.

- Vol. I. p. 566. col. 2. l. 10. from the bottom. For "Eubea, now the Black Sea," read "Eubœa, now Negropont."
- Vol. II. p. 374. col. 2. l. 27. For "the old English writers call those large muskets *calivers*, &c." read "the old English writers call the *hand-gun* a *caliver*, and that which was fired with a rest sometimes a *musket* and sometimes a *barquebuss*. See *Shakespeare*, 2d part *Henry IV. Steevens*."
- Vol. III. p. 19. article BAROCO. Read
Omnis homo est bipes,
Aliquid animal non est bipes ;
Aliquid animal non est homo.
- p. 417. col. 2. For "BOSWORTA," read "BOSWORTH."
 l. 21. For "Richard" read "Richmond;" for "Henry III." read "Henry VII."
 N. B. These errors in the article BOSWORTH do not run through the whole impression.
- p. 439. col. 1. l. 26. from the bottom. For "*b b, arifla*," read "*a, a, arifla*."
 col. 2. l. 1. from the top. Read "trophœolum."
- p. 493. col. 1. l. 22. For "manners," read "miners."
 col. 2. l. 13. from the bottom. Read "Sir Roger Man-wood chief-baron."
- Vol. IV. p. 342. col. 1. l. 10. from the bottom. Read "Plate CXXXVI."
 p. 360. col. 2. l. 22. from the bottom. Read "L. 40 a-year."
- Vol. V. p. 57. col. 2. l. 4. For *idæ*, read *idææ*.
 p. 89. col. 2. l. 16. from the bottom. Read "felony without benefit of clergy, by stat. &c."
 p. 105. col. 2. l. 16. For "false," read "sefs."
 p. 135. col. 2. l. 24. For "Redcliffe," read "Ratcliffe."
 p. 496. col. 1. For "ally," read "tally."
 p. 509. col. 2. l. 14. For "Cambridge," read "Oxford."
 p. 720. col. 2. l. 14. For "goddefs," read "god."
- Vol. IX. p. 160. col. 1. l. 9. from the bottom. For "Edward II." read "Richard I."
- Vol. XIII. p. 131. col. 1. l. 13. For "meek," read "mock."
 p. 132. col. 1. l. 28. from the bottom. For "call," read "cull."
 p. 169. Note (A). Read "the person was sworn, &c."
 p. 210. col. 1. l. 15. For "spreads," read "spread."
 col. 2. l. 27. For "fit," read "set."
 p. 263. col. 1. l. 10. from the bottom. For "inseparable," read "measurable."
 col. 2. l. 29. For "shining," read "thinning."
 p. 287. and p. 288. to be cancelled.
 p. 289. col. 1. To Cor. 6. add, "This proposition is true in lenses and mirrors, but not in single refracting surfaces."
 p. 521. last line. For "Prommetichus," read "Pflammetichus."
 p. 682. col. 1. l. 17. from the bottom. For "others appears," read "others appear."
 col. 2. l. 15. For "Brteagne," read "Bretagne."
- Vol. XIV. p. 118. col. 2. to l. 7. from the end, add, "For if the semicircle described on the diameter BN, which corresponds to the whole arch AN, be divided into an indefinite number of equal arches Gg, &c. the sum of all the lines NF will be equal to as many times NK as there are arches in the same circle equal to Gg."
 p. 119. col. 1. l. 15. For "corrupody," read "corresponding."
 p. 137. at the end of the article "PENTLAND," dele "See PICTLAND."


DIRECTIONS FOR PLACING THE PLATES OF VOL. XIV.

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